A Study of Japanese Loanword Naturalisation by Australian Learners of Japanese

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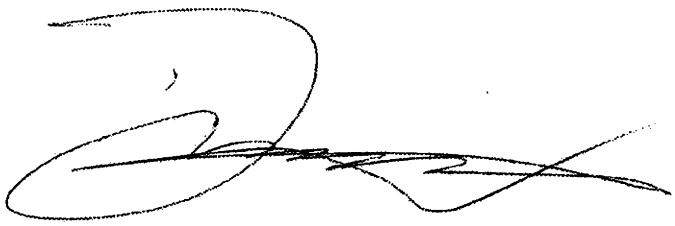
Statement

Except where otherwise acknowledged, this thesis is entirely my own work.



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Abstract

Gairaigo, or Loanword Japanese, are one of the three word sources (the others being Native Japanese, and Sino Japanese) of modern standard Japanese, and take up a significant and growing sector of the lexicon of the language. Despite this, learners are most often only introduced to *gairaigo* lexical units and a limited number of naturalisation phenomenon. This in turn creates difficulties for students when the need arises to naturalise foreign words into communicable Loanword Japanese.

The present study centres on a model of naturalisation, proposed by Nomoto (1990) of the National Language Research Institute, which we refer to as Japanese Loanword Naturalisation (JLN). The first four stages of this model, Open Syllabication, Germinate Formation, Vowel Naturalisation, and Consonant Naturalisation were selected for a quantitative survey of the JLN production of Australian Japanese learners at the Australian National University.

The ultimate goal of the present study is to clarify the JLN models adopted by learners at different levels. Unique learner strengths and weaknesses in production were identified which include rule hypercorrection, difficulties with specific types of phoneme naturalisation, as well as difficulties with specific moraic structures.

Abbreviations

AE	Australian English
ANU	Australian National University
CA	Contrastive Analysis
CN	Consonant Naturalisation
CV	Conservative Variety
E	English
ESL	English as a Second Language
G1	Group 1
G2	Group 2
G3	Group 3
GF	Germinate Formation
IL	Interlanguage
IPA	International Phonetic Alphabet
IV	Innovative Variety
J	Japanese
JLN	Japanese Loanword Naturalisation
JSL	Japanese as a Second Language
L1	First language
LJ	Loanword Japanese
NJ	Native Japanese
OS	Open Syllabication
SJ	Sino Japanese
SLA	Second Language Acquisition
TL	Target language
USAE	United States of America English
VN	Vowel Naturalisation
WJ	Western Japanese

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Chapter 1
Introduction

1.1 Aim

Gairaigo, or loanwords in Japanese, make up a significant and unavoidable part of the lexicon to be acquired by foreign Japanese language learners. The investigator experienced difficulties in the correct acquisition of *gairaigo* as a student of the Japanese language, which were confirmed as typical difficulties for many fellow Australian learners in examinations of *gairaigo* production years later in student composition and spoken Japanese in classroom settings.

One of the realities faced by learners of Japanese is the surprising general lack of suitable materials for the study of Loanword Japanese (LJ). This situation can only exasperate the difficulties experienced by learners in the transformation of foreign words into LJ, a demand not existent in the case of learning *kanji* and *hiragana*, in which case students main concern with learning is the memorization of pre-existent lexical items. As detailed in Appendix 1: "LJ Treatment in Related Teaching Materials", the vast majority of texts introduce moraic units (*katakana* characters) along with a number of lexical items. Very few of the texts attempt to delineate the phonological rules for naturalisation of foreign words to LJ. This situation could at best be described as presenting a deductive approach to the instruction of LJ phonology rather than an explicit, inductive approach.

In acquiring proficiency in LJ, learners are faced with two main tasks: (i) the memorization of pre-existing LJ lexical items (which is satisfactorily covered by conventional Japanese language textbooks), and (ii) the mastery of the phonological naturalisation model used in creating new LJ from the borrowed words of other languages. The present study focuses on the later of these two competencies.

The present study refers to this model as Japanese Loanword Naturalisation (JLN). Modern Japanese contains both innovative and conservative varieties of JLN, and

has experienced a number of historical periods where the inventories of the stages of naturalisation (Nomoto 1990 identifies these as Open Syllabication, Germinate Formation, Vowel Naturalisation and Consonant Naturalisation) that make up JLN have gone through change and expansion. Our study centers on the surveying the state of acquisition of the most up-to-date versions of JLN by Australian learners.

In order to most accurately survey this production, factors influencing the correct production of JLN must be taken into account. Second language acquisition (SLA) researchers note learners' acquisition of a second/foreign language is influenced by first language, universal interlanguage and individual variation. The present study attempts to contribute to Japanese language pedagogy, and in particular the little covered instruction of JLN, by presenting both a JLN model and survey results highlighting the JLN production characteristics of Australian learners while taking these SLA factors into consideration.

The present study divided subjects into three cells of beginners, intermediates and advanced Japanese speakers based on the results of the placement test for ANU Japanese language courses. The assumption was that JNLP is linked to overall Japanese ability, and that selection of subjects by placement test results would be the most effective means of allocating subjects. 30 Australian subjects, as well as a number of Japanese informants and pilot survey control group subjects, were surveyed in order to establish possible emerging patterns for the four following research questions:

Research Question 1: What are the phonological forms of beginner, intermediate and advanced Australian speakers of Japanese in JLN Open Syllabication? How and why do they differ from native Japanese production?

Research Question 2: What are the phonological forms of beginner, intermediate and advanced Australian speakers of Japanese in JLN Germinate Formation? How and why do they differ from native Japanese production?

Research Question 3: What are the phonological forms of beginner, intermediate and advanced Australian speakers of Japanese in JLN Vowel Naturalisation? How and why do they differ from native Japanese production?

Research Question 4: What are the phonological forms of beginner, intermediate and advanced Australian speakers of Japanese in JLN Consonant Naturalisation? How and why do they differ from native Japanese production?

The ultimate goal of the present study is therefore to clarify the JLN models adopted by Australian Japanese learners at different levels, by addressing the above research questions.

1.2 Japanese Loanwords and scope of the study

The present study was limited to researching the acquisition of JLN by Australian learners of Japanese. Specific borrowing category limitations, loanword type, and historical period of JLN model used exist and are detailed in the following sub-sections.

1.2.1 Borrowing

Backhouse (1996:80-81) notes languages are constantly adding new, and abandoning old words according to the necessity of the community of speakers. He also notes languages can form new words through either (i) other language borrowing, or via (ii) compounding or derivation of mother language items. Our study is interested solely in the language borrowing form of word formation.

Fundamentally borrowing can only occur when there is contact between the two languages in question. When the language 'lending' the item to the 'borrowing' language does so, this exchange can take place via spoken or written media according to the 'borrowing' individual or group's model of the semantic and phonetic/orthographic value of the item. The product of this borrowing may or may not be subject to a shift in part of speech, semantic/lexical (meaning) or phonetic/orthographic (form) value.

Two examples of the word formation referred to by Backhouse above can be found in Japanese lexical items which express the term known in English as 'Information Technology'. Both items involve a direct acceptance of the semantic value (meaning) of the English original. However, one involves the acceptance of (a) the meaning, together with the compounding of already existent mother language items *jouhou gijutsu* with the two words *information* and *technology* (made up of the morphemes *jou hou*; information and *gi* technique *jutsu* science; technology). Another item *infoomeshon tekunorojii* involves acceptance of (a) the meaning, and (b) the pronunciation (form): the item is a loanword. Other examples include *zunou kikan/kenkyuu kikan* (compounding) and *shinku tanku* (borrowing) for 'think tank', *nattoku shinryou* (compounding) and *infoomudo konsento* (borrowing) for 'informed consent', *gaibu itaku/gyoumu itaku* (compounding) and *autosooshingu* (borrowing) for 'outsourcing'.

Quite frequently, written media are easily accepted from foreign languages into Japanese. However, English spelling is not without the exception of irregulars, and the direct borrowing of words from the orthography of English into the more regular Japanese orthography can be problematic. For example, the author speculates the loanword item *airon* borrowed from the English word "(clothes) iron)" E[aɪən] is the result of the direct transliteration of the original words' unreliable spelling.

Borrowings in which the original form is maintained while the meaning shifts

also exist: *handoru*, so phonetically close to the English word "handle", changes meaning to indicate a "car steering wheel". *Famikon*, an abbreviation of the two items *famiri* and *konpyutaa* (family computer) has shifted to mean a household TV game.

Another common shift is that of part of speech. Nomoto (1991) notes loanwords can typically be transformed into verbs, adjectives, and adverbs. English nouns are typically changed to verbs (via adding the transformed item to a *–suru* verb) or adjective/adverbs by adding a –na or –i ending. As an example of adjectivization, the noun "news" (*nyuusu*) can be attached to a –na ending to become *nyuusu-na*, meaning news-worthy, newsy. The now archaic word *nau-i*, meaning contemporary, fashionable is another example of an English noun transformed and having a Japanese adjectival ending added to it to form a new word through a shift in part of speech.

This is not to say LJ pronunciation will be without its difficulties for the Australian student of Japanese. As noted above, borrowing can be taken from written sources. For example, the loanwords for Melbourne E[mɛlbən] J *meruborun*, Brisbane E[brɪzbən] J *burisubeen*, and iron E[aɪən] J *airon* all show oversights in English pronunciation's silent consonants, voicing, and spelling exceptions. All of the above items are exceptions, and therefore impossible to predict for the student of Japanese and must be memorized as distinct lexical units.

While students should be able to use the above lexical units, the ability to render foreign names, adjectives and verbs as loanwords in appropriate settings is vital to today's speaker of Japanese. The Japanese Ministry of Education, among other bodies, publishes loanword orthography guides that contain a reasonable number of lexicalised *katakana* transcribed place names, and other Japanese groups using lexicalised loanword items also publish documents which note some loanword items. However, loanwords are constantly being borrowed in such a great number of fields that ability in taking items from other language to be used, via loanword phonology, to Japanese is crucial. It is therefore necessary for Japanese language students to have competency in (i) recognition/production of the above lexicalised loanword items, and (ii) recognition/production of unique/new borrowed items produced through JLN. The present study focuses on the latter.

1.2.2 Loanwords

Sources for words in modern Japanese are typically divided into *Wago* (Native Japanese:"NJ"), *Kango* (Sino-Japanese:"SJ"), and *Gairaigo* (Loanword Japanese:"LJ"). Specific part-of-speech, orthographic, phonologic and socio-linguistic characteristics are possessed by each of these three word sources. By definition, loanwords are borrowed

from another language (in the case of Japanese, languages other than NJ and SJ), although we will re-examine this view in section 1.2.4.

Loanwords have an increasingly common presence within the Japanese language. Chung (1994) draws our attention to the fact that loanwords today hold an approximate 10% share of modern Japanese's total vocabulary. Continuing, Chung lists a 1983 study by H. Ishino noting loanwords total share of vocabulary in the following fields – fashion, beauty and catering: 80%+, sports: 76%, housing: 67%+. In terms of part-of-speech, LJ are easily introduced to the language as Backhouse (1996: 76) notes "(loanwords) occur chiefly as nouns and *na* adjectives, and ... combined with (the verb) *suru* to form verbs." This statement infers this vast, growing number of loanwords in modern Japanese is easily accepted into syntactically open classes.

This phenomenon is highly visible, and has received attention from leading Japanese language policy authorities such as the Japanese Language Council (1988), (1991), (2000) and National Language Research Institute (2002). Both suggest a move to minimize the use of the great number of loanwords in modern Japanese to a level of bare necessity, noting: (i) that such excessive use of LJ in the place of pre-existing SJ or NJ threatens to weaken the integrity of the original NJ and SJ usage and lexicon, (ii) that communicability of such LJ is dependent on the generation or age of speakers of Japanese and therefore may marginalise or discriminate certain age groups and (iii) that many borrowings are still ambiguous to the majority. However, despite these proposals, Yomiuri Newspaper (2002) notes in a February, 2002 NHK survey, respondents agreeing with possible federal loanword regulations failed to reach a level of 20% of responses. Clearly loanwords form an important, and widely publicly supported part of the language, but must be used with discretion.

1.2.3 Orthography/LJ relationship

In order to understand the governance of loanwords in modern Japanese, it is necessary to gain an appreciation of the role and coverage of the orthography. Modern Japanese is primarily written in '*kanji kana-majiri*' (a combination of the three systems below). The three orthographic systems functional in modern Japanese are:

(i) *Kanji*,
(ii) *Hiragana*, and
(iii) *Katakana*

Alfonso (1981) notes that whereas the English language, like Greek and Russian,

uses an alphabet system in which graphic symbols are used to represent single (vowel or consonant) sounds, Japanese possesses two systems of writing: the cursive *hiragana*, and the squarish *katakana*, which inherently carry the value of a sound block known as a "mora", and an ideographic/logographic system of writing, *kanji*, is used that carries both sound and morphemic value. Let us now turn to the role of the orthography in Japanese loanword phonology. Today, the vast majority of loanwords (excluding Chinese personal/place names and some Korean personal/place names) are written in *katakana*.

Loanwords are notated in *katakana* characters in modern Japanese. However, Takebe (1979) alludes to some Edo and pre-Edo borrowings original forms as being found as either *hiragana* (*giyaman* (glassware), *bateren* (a padre)) or *hiragana* or *kanji* (*kappa* (rain jacket), *pan* (bread)), and also notes some loanwords are/were written in *kanji*. As examples the present investigator presents the following:

Sourceword	Loanword	Phonemic transcription	*Kanji* transcription
Coffee [kɒfi]	[ko:çi:]	コーヒー[ko:çi]	珈琲 [ko:çi:]
Page [peɪdʒ]	[pe:dʒi]	ページ[pe:dʒi]	頁 [pe:dʒi]

(01) Sourceword, loanword and phonemic/kanji transcription

As can be seen above in (01), the first example's *kanji* reading is identical to its corresponding *katakana* phonemic loanword reading. It is important to note these examples are limited in nature and mostly accessible in *katakana* form for modern speakers/learners of Japanese. Endo (1989:213) notes "Loanwords have historically been notated in *hiragana* at times, and even today their orthography is conducted in *kanji* or *hiragana* at times for special effect. However as a rule loanwords are notated in *katakana*". This study will focus solely on the pronunciation of loanwords which are/can be transcribed in *katakana*.

While the phonetic inventory for the borrowing of loanwords (detailed in Chapter 2) is limited, the variety of available *katakana* orthographic inventory that may be applied in writing the language is actually wider than this. These expanded orthographic inventories do not, however, represent any strict conservative or innovative varieties of JLN moraic units. Rather, they are used as a kind of surrogate IPA system in the teaching of foreign languages (as a mnemonic), and highlight pronunciation describe items most Japanese speakers would not recognize as being significantly phonetically different. For example the Korean pronunciation *song* can be written ソング normally, but in order to define pronunciation as closely as possible (devoicing), ソン゛ can be used.

Other Korean examples include *hap* ハプ (J/*hapu*。/) and *mium* ミウム (J/miumu。/). With Russian, vowel quality and consonant length can be differentiated through the use of *katakana* orthography, such as in the illustrating the consonant quality difference between *sha* (ша) and *sya* (ща), transcribed respectively as シヤ (J/ʃa/) and ッシヤ(J/ʃʃa/). As such these examples should be considered special exceptions for use in language textbooks, and as removed from regular linguistic currency.

We have so far established that loanwords in Japanese are notated in *katakana*. However, not all use of *katakana* is relegated only to loanword notation. In order to elucidate the scope of the present study it is necessary to understand the difference between what Takebe (1989) refers to as *katakana-kaki-no-go* (linguistic utterances notated in *katakana*), and *gairaigo* (loanwords). Kawaharazaki (1979:36) notes *katakana* is used in the transliteration of loanwords, foreign place names, and foreign peoples names, but that it also has the following non-LJ functions: writing of animal/plant names, onomatopoeia, and in order to highlight words or phrases (in the same way italics are used in English), and qualifies his studies in his 1989 study by noting that *katakana* is also used to: write a) words usually written in *kanji* (where the writer feels their meaning is not properly conveyed by the use of *kanji*), b) sounds, animal calls, c) slang/cant, d) emoticons, e) *furigana* (characters used alongside *kanji* which provide phonemic reading of same), f) foreigner talk discourse (in order to appeal the communication is broken Japanese), and g) as numbering in the same way A, B, C etc are used in English. While uses of *katakana* in modern Japanese are numerous, the present study aims to examine only loanwords.

1.2.4 Historical movement in JLN

Takebe (1979) gives an historical treatment of loanwords, noting items borrowed toward the end of the Muromachi period from Portuguese (via foreign trading) and Spanish (via missionary activity, trade). Phonologically, in that era none of the moraic units featured in each lexical item differed in any way from the mora of NJ or SJ. The only difference citable may be a greater freedom of the combination/order of these morae. For example, while the word for bread, [pañ] features morae containing the consonant [p] and vowel [a] in a word-initial position, the same mora [pa] is featured in the SJ word for 'breakthrough', [toppa]. The existence of such historical items is evidence that the phonology of SJ and LJ is not differentiated due to cultural difference, but rather difference of historical periods of borrowing. Takebe (1979) notes other borrowings include Dutch (trading) throughout the Edo period, and that, excluding the influence of German (via medicine, philosophy and mountaineering), French (via art and fashion) and Italian (via music) from the Meiji

period, the vast majority of borrowing is from the English language. Backhouse (1996) notes 80% of dictionary loanword entries today stem from English. The JLN models used in each of the eras of historical borrowings differ in phonological structure and phonetic inventory from earlier borrowings.

Backhouse (1996) draws a line between NJ, SJ and WJ (Western Japanese) loanwords. However, a distinction must be made not between NJ and SJ/WJ but between NJ, SJ and WJ on historical grounds. Towards a definition of "readings" (i.e. systematic phonological model of borrowing) from Chinese, Aruku Shuppan Henshu-bu (ed.) (1994: 220) notes pronunciation of *kanji* in China was adapted to Japanese pronunciation, and is known as *on-yomi* or "sound reading". Further, H. Ito (1988) notes the historical distinction of *kanji* readings in Japanese into *go-on* (Wu dynasty readings), *kan-on* (Han dynasty readings) and *tou-on* (Tang dynasty readings).

However, these theories do not explain the existence of the present readings and pronunciation of place names and personal names found in the countries which share some extent of *kanji* culture, being mainland China, Hong Kong, Korea,..Specifically, while the vast majority of Chinese personal names (*Mao Tse-tung* 毛沢東 J[mo:takɯ:to:] and place names *Su Zhou* 蘇州 J[soʃɯ:]) are pronounced in SJ *on-yomi* in regular spoken/written communication, conspicuous exceptions exist.

Firstly, while many place and other names are available in modern LJ readings as well as SJ readings, some names only intelligibly exist in LJ reading. For example, while many place names for locations in China have been lexicalised into Japanese via what Ito or Vance recognize as SJ phonology, some names such as J[hoŋkoñ] (for 香港 Hong Kong, where the only *on-yomi* for the first character 香 is *kou/kyou* and for 港 is *kou*) and J[kantoñ] (for 広東 Canton where the only *on-yomi* for the first character 広 is *kou* and for 東 is *tou*). Shanghai (上海 [ʃaŋhai] is made up of two characters usually ready *jou* + *kai*, and the Chinese luncheon cuisine of yum-cha (飲茶 J[jamɯtʃa]) is made up of two characters usually pronounced *in* + *cha*.

Korean examples also exist. To generalize, it can be said no example of a place or personal name in Korea exists in which SJ reading is permitted. Due to socio-cultural influences, Chinese sino-language speakers feel comfortable with personal and place names from China to be read in the *on-yomi* that Aruku and Ito refer to above. However, Korean speakers, who use *kanji* in many place and personal names, require these names to be read in a manner close to the actual Korean reading.

I have shown that those Chinese names not lexicalised, and Korean place and personal names can and are given a phonological value close to the mother language original. This is to say that while Backhouse and Ito are correct in asserting Chinese

go-on, *kan-on* and *to-on* historical *kanji* readings, that today, if the above SJ nouns are not delegated to *on-yomi* reading, they will be delegated as all other loanwords to be filtered through the LJ phonological model. It is for this reason I choose the term "loanword", not "western loanword" for the purposes of this study. To summarize, JLN models have evolved historically and reflect historical, rather than culturally specific phonological models for the reception of loanwords.

1.2.5 Shifts and expansion of the JLN inventory

JLN rules are moving through a shift with open and closed processes subject to this effect. This shift (and the new moraic units and resultant naturalisation rules recognized) is still the topic of debate. Standpoints are observable in Japanese government language policy, research, JFL textbooks and other materials, and is detailed in Chapter 2. Along with a range of character inventory proposals by Japanese language lexicographers (Kenkyusha 1974, Takebayashi 1992, Katsumata 1954 et all), textbook authors/teachers (3A Network 1988, Alfonso 1981, Aruku 1994, AOTS 1991, Gakken 1976, Hadamitzky & Spahn 1996, Higurashi 1998, Inagaki 1986, Inter-University Center 1983, JLPC 1970, Japan Foundation 1978 et all) and linguists (Lovins 1975, Katayama 1998, Nomoto 1991, Takebe 1979, 1980, 1989, Maeda 1971, Tomita 1988, Found 1998, Umeda 1989, Kawaharazaki 1989 et all), the last changes in the inventory of characters recognized by the Japanese government appeared in Cabinet Bulletin 2 on 28/6/1991. This report is significantly liberalized when compared to the 15/3/1959 National Language Commission Report "*Gairaigo* no Hyouki". Recently, the 22nd National Language Commission ('Dai 22-ki Kokugo Shingi-kai') included a report entitled "Kokusai Shakai ni Taiou Suru Nihongo no Arikata" which contained no additions or deletions of the character inventory.

Lovins (1973) and Endo (1989) recognize this tendency for JLN (Japanese Loanword) rules to slowly change. This change can take place in 'closed' and 'open' processes of naturalisation. More specifically, this change refers to (i) the actual segmental inventory (represented in *katakana* characters) and (ii) the rules (phonological operations) governing the process of transformation from item input through operative level, have and continue to move through an expansion. More concretely: Open processes are the segmental inventory of JLN. Specifically, JLN is today more liberal than ever in terms of its segmental inventory and the environmental constraints for that inventory, with both Conservative Varieties and Innovative Varieties existing.

Vance (1987) notes: "Modern Tokyo speakers fall along a continuum in terms of how thoroughly recent borrowings are assimilated to the native phonemic pattern.. (in

the).. conservative variety... borrowings are completely assimilated. (In the) innovative variety, several phones occur in new environments and in some cases the result has been a phonemic split". For example, [ti:] as in the English word 'team' is naturalized as:

Australian English (AE)	Conservative JLN	Innovative JLN
[ti:m]	[ʧi:m]	[ti:mɯ]

(02) JLN Conservative and Innovative Variety examples

In the case of conservative JLN, E[t] before the environment E[i] must be transformed to [ʧi], together with the E[ʧ] before E[i] also transforming to JLN[ʧi]. However, in more innovative varieties, [t] and [ʧ] form a minimal pair, active in a range of environments (to be discussed later). This kind of expansion and shift in rules on a segmental level is a key characteristic to modern LJ and JLN.

While less common, I refer to accentuation, assimilation and open syllabication as closed naturalisation processes. For example, due to JLN's open syllabication constraint, no consonant can appear without a vowel following it. In contrast, following the plosive /k/, the vowel /i/ was previously inserted in places where no vowel existed. Today this rule has changed to insert the vowel /u/ in its place. As a result we have the lexical items *sutoraiki* 'labor strike', and *sutoraiku* 'baseball strike'. The former preserves the archaic form of the consonant syllabication, whereas the latter preserves the form used including in present day.

In order to represent the range of most up-to-date JLN varieties possible, the present study takes in a JLN model that is Innovative (IV) in its phonemic inventory, yet clearly defines reductions to a conservative variety (CV) for use as reference and in its survey (See Section 1.3 and Chapter 3 for details of the survey).

1.2.6 Naturalisation and JLN model

Naturalisation refers to the systematic introduction of foreign lexical items into a languages phonology and/or orthography. The present study was influenced most strongly by Nomoto (1990) and Silverman (1992) as below. This influence forms the foundation of the study's JLN model.

Katayama (1998:12-3) quotes Silverman (1992) as presenting a model of loanword phonology naturalisation as follows: at the Perceptual Level, "acoustic signals are constrained by the native segmental inventory" and "..will be the inputs to (the next level). At the Operative Level, strings undergo phonological operations triggered by

native phonotactic constraints." For example, the English word *blue* is naturalized to the loanword *buruu* as follows:

Input: /bluw/ 'blue'

← constrained by the native segmental inventory

Perceptual Level: [bɾɯ:]

← constrained by the native phonological structure

Operative Level: [bɯɾɯ:]

(03) Silverman's order of loanword naturalisation

Nomoto (1990) proposed the following outstanding Japanese-specific model (see (04) below) of naturalisation of words entering Japanese from other languages. His example involves a nonsense word [æɵlətitʰ] from a fictional language and its naturalisation.

	[æ	ɵ	l	ə	t	i	tʰ]
1. Open Syllabication			ɯ				o
2. Germinate Formation							Q (t)
3. Vowel Naturalisation		a			a		i
4. Consonant Naturalisation			s		r	tʃ	t
5. Accent Naturalisation	a	sɯ		ra		tʃi	Q(t) to
6. Orthography	ア	ス		ラ		チ	ッ ト

(04) Nomoto's JLN model

While the specifics of naturalisation, the central focus of the present work, will be presented in Chapter 2, an outline of Nomoto's model of naturalisation will serve to better highlight the authors' approach. Firstly, in Nomoto's model, an utterance is first subject to open vowel syllabication according to environment. Next, consonant assimilation takes place, followed by vowel, consonant and accent naturalisation. The item is finally transformed into Japanese orthography (*katakana* script).

Nomoto's model does an excellent job in accounting for processes of naturalisation in JLN, and does much to explain this process as being universally applicable to lending languages. However, as noted in Silverman (1992), the first level of this process must be in constraint by the native segmental inventory, for without this, the targets for native syllabication cannot be identified, let alone transformed. The actual

order of naturalisation (see (05) below) is thus:

	[æ	ɵ	l	ə	t	i	tʰ]
1. Vowel Naturalisation	a			a			i
2. Consonant Naturalisation		s	r		tʃ*		t
3. Open Syllabication			ɯ				o
4. Germinate Formation							Q (t)
5. Accent Naturalisation	a	sɯ	ra		tʃi		Q(t) to
6. Orthography	ア	ス	ラ		チ	ッ	ト

*[ti] may naturalise to either [tʃi] or [ti]

(05) JLN model proposed by current study

This model acknowledges both Silverman and Nomoto. This vowel and consonant naturalisation (native segmental inventory constraint) is a first stage, with native phonology (JLN constraint) being a second stage. The first inventory constraint stage could be seen as being an open process (open to change), and the second phonological constraint stage as a more closed process (closed to change).

To review, a lending language provides an item to the borrowing language (Japanese). This item is next either 1) expressed by code-changing or 2) undergoes naturalisation at a) perceptual level, and next b) at an operative (either innovative or conservatively) level.

1.3 Methodology

The present study focuses on the JLN production of Australian learners. This essentially differs from the qualitative descriptions of given language varieties in that non-native speakers each possess a unique model of the language, and work toward a gradual acquisition of, but do not possess a complete phonological model used by members of the native linguistic community of Japanese.

The present work therefore is comprised of a JLN quantitative survey with Australian learners. In order to effectively conduct this survey, it was necessary to (i) set subject selection criteria and the independent variable; (ii) determine AE and JLN phonemic inventories; (ii) identify possible interference in production (via Contrastive Analysis, Markedness, Universal Interlanguage and Non-linguistic Variation theories), and (iii) construct and conduct an appropriate survey.

The subjects of the survey were as those who are: (i) Australian English (AE) first language speakers (to account for first language interference); (ii) either male or female in their 20s to early 30s (who have all been exposed to more recent JLN models); (iii) those students who had received initial *katakana*/some JLN phenomena.

Level of Japanese language study was set as the Independent Variable (under the primary assumption Japanese language and JLN proficiency are related), with subjects divided subjects into three groups: Group 1 (Completed 1st year written Japanese), Group 2 (Completed 2nd year written Japanese), and Group 3 (Completed 3+ year Japanese) in order to account for differing levels of development in Japanese language proficiency).

AE and JLN phonemic inventories were determined. The AE inventory was selected from pre-existing materials. However, the JLN inventory, due to recent expansion/shift in the inventory, was confirmed through literature/media and language informant checks by the present investigator, based on pre-existing materials. These inventories would serve as benchmarks for both correct JLN production and AE interference. A Contrastive Analysis was next conducted of the two inventories, and added to pre-existing literature on Japanese learner pronunciation and *katakana*-related difficulties to predict subject strengths and weaknesses for the present survey, that were later compared with subject production.

The survey itself consisted of a warm-up, followed by subjects listening to nonsense words/words with low lexicality on a tape by the investigator (a native AE speaker), and next pronouncing these items in JNLP. Items were selected that included structures that test the first four levels of JLN described in Section 1.2.6 above (Open Syllabication, Germinate Formation, Consonant Naturalisation and Vowel Naturalisation), as well as a combined moraic structure assessment.

Production for each subject was then transcribed into International Phonetic Alphabet (see Appendix 5: Production Lists), and then assigned a value to be tabulated for analysis (see Appendix 6: Production Tallies). Assessment criterion were set that would allow for the presence of correct production, first language (AE) interference, target language (JLN) hypercorrection, other interference, or absence. The criteria reflect the position taken by the present study that Second Language Acquisition is influenced linguistically by first language, target language and universal interlanguage.

Production was then assessed from values assigned in Appendix 6: Production Tallies, and given unit and percentage values. The production values of Group 1, Group 2 and Group 3 were compared within each of the four JLN stages surveyed in order to answer Research Questions 1 - 4. Production values were also compared between JLN stages to check for the possible markedness of certain stages. In this way, the present study attempts to clarify the JLN models adopted by Australian Japanese learners at different levels. Methodology specifics will be detailed in Chapter 3.

1.4 Organisation of the study

The present study is comprised of four chapters. Chapter 1 *Introduction* is comprised of an introduction to the aims and focus of this study. Chapter 2 *AE/JLN Contrastive Analysis* details the phonological models of Australian English (AE) and JLN (including JLN inventory and rules) used as benchmarks for the present study. The two models are presented divided into the four naturalisation levels focused on by this study: Open Syllabication, Germinate Formation, Vowel Naturalisation and Consonant Naturalisation. The two models are compared (including CA commentary from previous related works) and potential difficulties highlighted in order to determine likely difficulties by learners/subjects when producing target structures for each JLN level in the present survey.

Chapter 3 *Methodology* describes the main project of the present study, the results and analysis of which follow in Chapter 4 Results and Analysis. This description of the surveys' methodology includes SLA theories (CA, Markedness, Interlanguage, and variability) applied by the present study, subjects (dependent and independent variables), survey item selection, procedures (conduction, transcription, and assessment criterion).

Chapter 4 *Analysis* examines the production of survey subjects via an analysis of results in each of the JLN levels: Open Syllabication, Germinate Formation, Vowel Naturalisation (vowel quality and quantity) and Consonant Naturalisation (consonant quality and consonant moraic units), and a combined analysis in moraic structure. Summarised findings to the present study are given here.

Chapter 5 *Conclusion* returns to the Research Questions delineated above and summarizes the current study's findings with regard to OS, GF, VN and CV in terms of the four research questions as noted in 1.1.

1.4.1 Romanisation

Romanisation has been used to represent Japanese script in this study, unless International Phonetic Alphabet is required for detailed phonetic transcription. The study adopts the Hepburn system.

Appendix 1: LJ Treatment in Related Teaching Materials

AUTHOR	TITLE	①	②	③
3A Network (ed.) (1998)	Mina no Nihongo	O	X	X
Alfonso, A. (1981)	The Japanese Writing System: A Structural Approach	O	O	X
Aruku Nihongo Shuppan Henshu-bu (ed.) (1994)	Nihongo Nouryoku Shiken *Kanji* Handobukku	O	O	△
Assoc. Overseas Technical Scholarship (ed.) (1991)	Shin Nihongo no Kiso: Japanese *Kana* Workbook	O	O	△
Gakken (1976)	Japanese for Beginners	O	X	X
Hadamitsky, W. & Spahn, M. (1996)	*Kanji* and *Kana*	O	O	△
Higurashi, Y. (1998)	Elementary Functional Japanese: Inter-cultural Communication 1, 2	O	O	△
Inagaki, S. (1986)	Nihongo no Kakikata Handobukku	O	X	△
Inter-university Center Staff (ed.) (1983)	Basic Japanese - A Review Text	O	X	X
Japanese Language Promotion Center (1970)	Intensive Course in Japanese: Elementary	O	X	X
Japan Foundation (1978)	Nihongo: *Kana* - An Introduction to Japanese Syllabary	O	O	△
Japanese Section, Center for Ling.& Cultural Research (1983)	A Course in Modern Japanese	O	X	X
Kosaka Mitamura, Y. (1985)	Let's Learn *Katakana*	O	O	△
Mizutani, N. (1990)	First Lessons in Japanese	O	X	X
Mizutani, O. & N. (1977)	An Introduction to Modern Japanese	O	X	X
Nomoto, K. (1994)	*Gairaigo no Keisei to Sono Kyouiku*	O	O	▲
Okana, K. Hasegawa, Y. (1994)	Total Japanese: Reading and Writing	O	X	X
Society for Japanese Language Teaching (1994)	Japanese for Busy People	O	X	X
Tsukuba Language Group (1991)	Situational Functional Japanese	O	X	X

①= introduction of *katakana* characters and LJ lexical items

②= introduction of any JLN rules

③=explicit JLN rules (X=no coverage, △=limited moraic unit + examples, ▲=full coverage)

Chapter 2
AE/JLN Contrastive Analysis

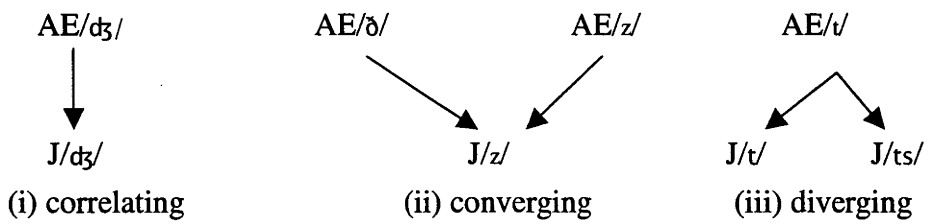
2.0 Introduction

The following chapter presents models of AE and JLN, necessary as (i) mother language and target language reference details for Contrastive Analysis; (ii) input/output for the present study's JLN model, and (iii) a source of assessment of subject JLN production for the present study's survey (see Chapters 3 and 4). JLN naturalisation rules are delineated next, and areas of predicted difficulty are detailed at the end of the chapter.

2.1 Contrastive Analysis

In interlanguage phonology, the speaker's first language is an important influence on target language production. Contrastive Analysis was designed to account for problems and difficulties of L2 speakers via a comparison of the mother and target languages. Several CA works influential to the present study are introduced below.

Nemser (1971) notes studies of comparative phonology traditionally center on the analysis of differences of production on a phonemic level. Specifically, phonetic descriptions of allophones of the two languages phonemes, and from there the inference of distributional rules governing the two languages phonemes and allophones. For example, on a phonemic level, correlating, diverging and converging phonemes are all possible (see (06) below).



(06) Correlating, diverging and converging phonemes

Nozawa (1980) submitted a report on pronunciation difficulties of Cantonese

learners of Japanese focusing on a CA discussion of error tendencies encountered by the researcher in the teaching of Japanese on location. Nozawa offers (i) a concise comparison of phonemic inventories, (ii) a model of Japanese phonemes and allophone occurrence locations, and (iii) common Cantonese learner L1 interference. While accounting for the pronunciation difficulties the researcher experienced first-hand in a teaching environment, the present author questions the universality of qualitative insights for varied learners, as well as not addressing the possibility of markedness in phonological acquisition.

Riney (1988) notes that CA works by Briere (1966) and Johansson (1973) both showed an important shift away from the predictive L1/L2 comparative study research design that did not allow for performance/responses outside CA target structures.

Briere's 1966 study involved the repetition by American English speakers of three different languages, and showed errors not predictable by the "interference" so popular within the CA movement of the time. Johansson's work involved 180 non-native Swedish speakers (from a total of 9 different L1 phonologies) and their errors in the pronunciation of Swedish, and noted that not all errors were attributable to negative transfer.

However, Major (1994) and Riney (1988) note CA, originally designed to account for all examples of deviation in linguistic production as interference or negative transfer from the first language, has not achieved the capacity to effectively predict all errors in a speakers mistakes in pronunciation.

CA is an analysis of predicted/after-the-fact errors attributed to L1 interference, and not an analysis of the subjects' overall performance. The former by its nature shuts out much important data in SLA studies. The present study acknowledges CA is a useful tool in establishing potential errors due to first language transfer, and accounting for production post-test, but also acknowledges survey design must not be confined to CA alone, and must include universal interlanguage, as well as non-linguistic individual variation (highlighted in Chapter 3) considerations.

2.2 Linguistic scope

The present study is a survey of Australian speakers' acquisition of JLN. Previous works into JLN/*katakana* acquisition by Min (1989), Chung (1994) and Nozawa (1980) treated production by a single nationality/ethnicity, whereas contemporary Australia is a multi-ethnic/lingual nation. It is therefore necessary, before entering into a Contrastive Analysis of the subjects' English and JLN, to define the two language entities to be compared in order to control variables for the current work's survey (delineated in Chapter 3: Methodology).

2.2.1 English variety

Much of the research describing the difficulties of "English" speakers learning Japanese are in fact misnomers, and address the speakers of a certain variety of that language. Any conception of English as a single entity does not allow for the reality of multiple dialects and variants of the English language as a conglomerate. As such, a contrastive analysis of "English" and Japanese must specify which variety (and the special characteristics that variety presents) is under consideration – in the case of the present study, it is AE.

As Lass (1990) notes, AE is a variety of Extra-Territorial English (a group of dialects all stemming from Southern English pronunciation which share similarities with English of South African, New Zealand etc.). Mannell (2000) notes divisions are made between cultivated, general and broad accents in AE. In today's society, it could be said that general AE is most predominant. This is supported by studies by Mitchell[1] (1946) and Bernard (1991) into acoustic studies examining the "averages" of pronunciation in AE.

Students studying Japanese at the ANU come from a diverse range of ethnic backgrounds. For the purposes of controlling variability in the present study, it is necessary to focus on only one form of the native or first language (English) - and for this work I have selected Anglo-Australian students who speak General Australian English (whose pronunciation of AE English is as delineated in the AE phonemic inventory found later in this chapter) as the focus of this study.

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[1] A.G. Mitchell and A. Delbridges (1946) classic work entitled "the Pronunciation of English in Australia", revised in 1965, delineated the pronunciation of Australian English's cultivated and broad varieties, moving away from a prescriptive to descriptive encapsulation of our pronunciation.
According to Mannell (2000), Bernard, and Bernard and Mitchell performed acoustic studies on the pronunciations of the average speaker of General Australian English. Clark (1988) performed a survey, averaging 60 speakers pronunciation which offered some still controversial changes to the findings of Bernard, and updating the model Mitchell and Delbridge described.

2.2.2 Japanese Variety

In this study, modern standard Japanese (of which JLN forms a part) is the target language. While a significant number of regional dialects exist in modern Japan today, native inhabitants can understand *kyoutsu-go*: standard modern Japanese. It should be noted that, arguably, the two most popular (along with being socially prestigious) dialects are those of the Kanto (Tokyo, Chiba, Saitama areas) and Kansai (Kyoto, Nara, Osaka, Hyogo), with both have differing pronunciation (including pitch patterning[2], existence/lack of devoicing). Since the Kanto dialect is synonymous with standard modern Japanese pronunciation, Kanto area Japanese language informants were selected for both the JLN model, and control group.

[2] Yamada (1994) noted dialectal speakers follow similar patterns to non-native learners when attempting to acquire complete standard Japanese supra-segmental phonological production – that is, they attempt to approach a complete model of pronunciation, but are nonetheless, imperfect models.

2.3 Phonemic inventories

The next step in accurately surveying Australian learner's production of JLN, is the definition of the specific phonemic inventories of languages involved both in the naturalisation of LJ, and those that influence the process of naturalisation - Australian English and JLN.

2.3.1 Previous studies on the AE phonemic inventory

A number of works dealing with traditional phonological descriptions were examined by the present study. Most of these works included (i) a phonemic inventory, (ii) allophonic realisations and distributional environments.

The present study applied the models of Mitchell & Delbridge (1965), Mannell and Cox (2000) as well as Bernard (1991) in the formulation of the model of AE described in the following sections of this chapter, with no changes being required in the model used for AE for the present study.

S. Ramasaran's (1990) collection of papers on the pronunciation provides useful insights into the description of L1 and dialectal pronunciation description. In a first article by R.K. Bansal (1990), Indian English is described as a dialect of English in phonological and phonetic terms. Linguistic variety is first described in general terms, noting many regional differences are sub-phonemic, noting the validity of the work as being applicable to all varieties of Indian English. Bansal next delineates the vowel and vowel glide system of the dialect, followed by consonants by describing: (i) phonemes, (ii) allophones, (iii) phonetic and distributional characteristic differences between the dialect and Received Pronunciation. The author next describes consonant cluster features, as well as syllable elision, word accent, accent/rhythm in connected speech and intonation. The author focuses on characteristic difference and characteristics in Indian English, and elucidates these clearly in the short space of the article.

Another paper by A.J.C. Pongweni (1990) describes the pronunciation of English vowels by a community of Bantu language speakers. The researcher first performs a CA of L1 English vowels to those of Shona (a Bantu language) vowels, as well as distributional considerations. A further paper by H. Martens (1990) features a description of a German variety of English. The author describes existent and non-existent vowel and consonant varieties and their distribution in the dialect.

Finally, R. Lass (1990) gives a model of the South African English vowel system. Lass first describes the complexity of language varieties, next describing the short, long monophthong vowels and diphthongs, as well as loanword vowels. The description centers on place and manner of articulation, as well as comparison with similar ETEs

(Extra-territorial English: varieties all stemming from Southern English pronunciation, such as Australian, South African and New Zealand English).

Nagata (1984) deals with the segmental, supra segmental and syllable structure of first and second-generation L2 speakers in Hawaii. After giving a brief summary of subjects, Nagata follows with the following survey structure: (i) segmental structure of L1 and L2, (ii) correspondence between the two, (iii) divergence between the two, (iv) convergence (i.e. where the two forms of one language come together in one form in the other language), (v) English closed versus Japanese open syllabic structure, (vi) English stress-accent and stress timed rhythm versus Japanese pitch-accent and syllable-timed rhythm (sic), along with Creole iso-syllabic pronunciation supra-segmental structure. Giving a good number of actual examples of English to Creole lexical item pronunciation changes.

2.3.2 Establishment of JLN moraic unit inventory

Towards establishing the present works' model of JLN, (i) works presenting an explicit JLN model, (ii) works delineating implied models (i.e. moraic unit inventories and/or simplified, incomplete JLN rules) and (iii) works in which the textual *katakana* content was examined for implied JLN model, were examined.

The first step was establishing the moraic unit/*katakana* character inventories recognized by 21 previous studies ((ii) and (i)), as well as by mass media/online publications[3] ((iii)). This began with the establishment of a base of commonly agreed units from works dating from the 1970s to today of Kawaharazaki (1979, 1989), Takebe (1979, 1980, 1980), Nomoto (1990), Katayama (1998) and Lovins (1975) Matsuzaki[4](1993) and others. For details, see Appendix 2: Acknowledged *Katakana* Units.

The second step involved examining the possibilities of all moraic units/*katakana* characters outside the perimeters of the above authors' studies. The rationale for this step was twofold: (a) Backhouse (1996) notes English loanwords

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[3] The present study made use of public internet search engines such as Yahoo (www.yahoo.co.jp) and Google (www.google.co.jp), which unlike their English language counterparts will perform a spider textual search for a single *katakana* character or combination of characters in a word-initial/medial/final position. Search engines proved useful and economic tools in determining the existence or non-existence of a character.

[4] Matsuzaki (1993) issued a study of expansion in the number of mora available to modern Japanese speakers, along with a resultant growth in LJ orthography. The study followed new morae identified as existing by a number of researchers and dictionary lexicographers by performing a count of the frequency of new morae. This approach involved cross-referencing and confirming units through the identification of actual lexical examples, and was coincidentally the same as the approach taken by the present study at the time, but accounted for different works to the present study's.

comprise 80% of dictionary loanword entries in Japanese today. The majority of loanword examples found in textbooks and *katakana* education materials center on English and it's implied phonetic input into JLN - all potential moraic/units (not only those involved in English-JLN naturalisation) used for the naturalisation of all languages into Japanese needed to be identified. (b) JLN's moraic unit and phonemic inventories have expanded significantly. All presently existent units needed to be accounted for. This step was conducted firstly by generating all possible expanded combinations of CV, CjV and CwV (C alone is non-existent, and V, N and Q are closed classes). These possible items were next searched for through scans of Japanese media relating to a range of countries and cultures (such as maps, travel guides, language textbooks etc - all of which used *katakana*), as well as use of Japanese Internet search engines.

In this way a foundation of items was determined from previous studies. An expanded moraic unit/*katakana* character inventory and phonetic realizations generated, and followed by a search for lexical items containing those characters. If lexical items were found, that item was validated, but if not was considered not yet part of the active inventory for the purposes of this study.

2.3.3 Previous studies on JLN naturalisation rules

The present study focuses on loanword production by Australian learners, assessed through a current productive model of JLN naturalisation. Such a study is comprised of (i) measuring non-native subject production, (ii) of naturalisation rules (iii) from one language (in this study's case, primarily AE) to Japanese. Towards this end, the most relevant previous studies were those of two main areas of linguistics. The first area (discussed in 2.3.2) focused on rules of use and instruction of *katakana*. The second area focused on phonological naturalisation rules.

Expansion in the inventory of *katakana* characters/moraic units used in JLN naturally implies the expansion of naturalisation rules through which those derivatives of foreign words are produced. As with the previous section (2.3.2), the expanded inventory, in this case of naturalisation rules, was examined and tested. The basis for this examination consisted of the works of Katayama (1998), Lovins (1975), Suzuki (1984) and to the greatest extent, the explicit JLN naturalisation rules delineated by Nomoto (1990).

Nomoto, Katayama and Lovins studied naturalisation from an English to Japanese perspective, with Suzuki studying Japanese to English naturalisation. Each took a comparative approach in examining naturalisation by examining the inputs from the original lexical form in the first language to the loanword form in the target language. This was achieved by contrasting phonemes, including distinctive features (phonemes)

and redundant features (allophones), accounting for environmental constraints.

Nomoto took the description of naturalisation further in presenting the process explicitly as being of a multi-tiered nature (the present study works to account for the first four stages of the process Nomoto delineated). This model was adjusted for the present study by first addressing differences in the input of US English (the variety of English Nomoto used in his work) and AE. The current moraic unit inventory was then added to the model and naturalisation rules for the derivation of those units deducted in the following way.

Possible foreign word sound quality/quantity inputs for each naturalisation rule were tested. A pilot test with Tokyo Japanese native speakers examining the input and target structures, and the additional comparative examination of current existent textual examples of loanwords and the original foreign word were next executed, with the results of these steps found in the present study's JLN naturalisation rules model.

2.4 AE/JLN and Naturalisation

The aim of this section is to (i) provide an overview of AE and JLN, (ii) detail the JLN Naturalisation model used in this work. This information will next be used to predict areas of difficulty for learners producing JLN items in Section 2.5.

2.4.0 Introduction

It is first important to note present studies (Lovins 1975, Katayama 1998) of the nature of JLN, and those on Japanese/English comparison (Fujimoto 1985-1988, Stern 1999, Kohmoto 1970) draw source L1 pronunciations from USAE. While AE and USAE share a great deal of similarity, significant differences in the two phonologies do exist. The present study, therefore, focuses on AE (based on Mitchell & Delbridge 1965, Bernard 1991, Mannell & Cox 2000).

Differences between American and Australian varieties include vowels, diphthongs, lack of a post-vocalic /r/, assimilation/consonant deletion, and intervocalic voicing of consonants. While a great deal of similarity undeniably exists, the above differences have a large effect on JLN naturalisation – large enough to warrant unique treatment of AE in the present and other works.

The present work's JLN Naturalisation model is outlined as follows (see (07) below). In stage 1, closed consonant(s) are treated by making them conform to Open Syllabication, followed by stage 2, where lax vowels located in given environments are subject to Germinate Formation. Finally Vowels in stage 3 and Consonants are naturalized in stage 4. Only stages 1 ~ 4 are covered in the present study, and are delineated in the following sections. The present study aims to present the rules following Nomoto's conventions.

	[æ	ɵ	ɪ	ə	t	i	tʰ]
1. Vowel Naturalisation		a			a		i
2. Consonant Naturalisation		s		r		tʃ*	t
3. Open Syllabication			ɯ				o
4. Germinate Formation							Q (t)
5. Accent Naturalisation	a	ɕɯ	ra		tʃi		Q(t) to
6. Orthography	ア	ス	ラ		チ	ッ	ト

*[ti] may naturalise to either [tʃi] or [ti]

(07) JLN model proposed by current study

2.4.1 Open Syllabication

2.4.1.1 Japanese moraic structure

Japanese is an open syllable language; the only possible moraic structures are (i) Vowel (V); (ii) Consonant + Vowel (CV); (iii) Consonant + Semi-vowel + Vowel (C j/w V)[5]; (iv) Moraic N (N); and (v) Germinate (Q). While each moraic unit retains its integrity as a moraic unit, combinations of morae potentially can create CC (QC, NC) combinations[6]: some examples of QC are /kyaQʧi aQpu/ 'catch up' and /baQgu/ 'bag', and of NC are /iNseNtibu/ 'incentive' and /kyaNbera/ 'Canberra'. However, consonant clusters within a syllable/moraic unit are unknown. Examples of these moraic structures are:

(i) Vowel: *oosutoraria* (Australia), *iguana* (iguana)
(ii) Consonant + Vowel *iguana* (iguana), *hoNkoN* (Hong Kong)
(iii) Consonant + Semi-vowel + Vowel *kyaNbera* (Canberra), *gwatemara* (Guatemala)
(iv) Moraic N: *kyaNbera* (Canberra), *myaNmaa* (Myanmar)
(v) Germinate: *appuru* (apple), *kyatchi* (catch)

2.4.1.2 English syllabic structure and consonant clusters

Kohmoto (1970) lists consonant clusters found in English that demonstrate the complex structure of sound combinations in English syllables[7]. These consonant clusters include word-initial (CC, CCC) and final (CC, CCC, CCCC) structures.

*5 The moraic structure description for Consonant + semi-vowel + vowel is based on Akamatsu (1994: p42).

*6 CC medial clusters starting with /N/ can also be observed in words listed in internet pages, including: /Np/ /koNpanioN/ 'companion' /toraNpeQto/ 'trumpet', /Nb/ /kaNbodʒia/ 'Cambodia' /koroNbia/ 'Columbia' /deNbaa/ 'Denver', /Nt/ /eNtaateiNmeNto/ 'entertainment' /boraNtia/ 'volunteer' /waN tuu surii/ 'one two three', /Nd/ /dʒeNdaa/ 'gender' /kareNdaa/ 'calendar' /iNdipeNdeNto/ 'independent', /Nk/ /suriranka/ 'Sri Lanka', /Ng/ /moNgoru/ 'Mongol' /taNgo/ 'tango' /Nts/ /fireNtse/ 'Firenze', /superaNtsa/ 'Speranza' /Ntʃ/ /furaNtʃaizu/ 'franchise' /koNcheruto/ 'concerto', /Ndʒ/ /meQseNdʒaa/ 'messenger' /baNdʒoo/ 'banjo' , /Ns/ /gaidaNsu/ 'guidance' /eijensii/ 'agency' , /Nz/ /iNfurueNza/ 'influenza', /Nʃ/ /fainaNʃaru/ 'financial' /koNʃeruje/ 'concierge', /Nh/ /mjuNheN/ 'Munich' /noNhikuʃoN/ 'non-fiction', /Nm/ /eNta:teiNmeNto/ 'entertainment' /mjaNmaa/ 'Myanmar', /Nn/ /puraNnaa/ 'planner', /Nr/ /suteNresu/ 'stainless' /maririN moNroo/ 'Marilyn Monroe', /Nj/ /beijiNgu pjoNjaN tetsudou/ 'Beijing Pyongyang Railway' /eNja/ 'Enya' and /Nw/ /oNwaado/ 'onward'. Other examples with /N/ are found in: /Npj/ /koNpjuuta/ 'computer', /Nty/ /iNtjuiQto/ 'intuit', /Ndj/ /eNdjuuro/ 'Enduro', /hoNdjurasu/ 'Honduras', /Nkj/ /saNkjuu/ 'thank you', /Ngj/ /abaNgjarudo/ 'Avante Guard', /Nmj/ /seQʃoNmjuujiʃaN/ 'session musician', /Nnj/ /buraNnjuu/ 'brand new' /aNnjoNhasejo/ (Korean language greeting). No examples were discovered by the author for /Nbj/, /Nhj/, /Nrj/, /Nkw/ or /Ngw/.

*7 While Kohmoto's (1970) source is USAE, the present study checked all consonant clusters shared with AE. Shaded items are only found in USAE, whereas non-shaded items are found in AE and USAE:

Initial clusters

All consonant clusters below are found in USAE and AE. /sp/ spin, /sm/ small, /kr/ crow, /fr/ fry, /bj/ beauty, /hj/ hue, /dw/ dwell, /spr/ spray, /skj/ skew, /st/ stay, /sn/ snail, /br/ bray, /θr/ three, /kj/ cure, /mj/ mute, /sw/ swim, /str/ street, /skw/ squall, /sk/ sky, /pr/ pray, /dr/ dry, /ʃr/ shrink, /fj/ few, /tw/ twin, /hw/ when, /skr/ scratch, /spl/ split, /sf/

sphere, /tr/ tray, /gr/ gray, /pj/ pure, /vj/ view, /kw/ quick, /ɵw/ thwart, /spj/ spew, /skl/ sclerosis

Final Clusters

While the vast majority of consonants in AE and USAE share the exact same distribution, it is important to note /r/ following a vowel (the shaded items in the following list), such as in the words *party*, *car*, *curb* in USAE is universally replaced by a long vowel in AE, thus making some of Kohmoto's list redundant for AE. All unshaded items are found in both AE and USAE.

-CC Clusters: /lp/ help, /ld/ build, /lv/ delve, /lm/ elm, /sk/ ask, /fs/ laughs, /rt/ heart, /rf/ scarf, /rʃ/ harsh, /rn/ barn, /tʃt/ watched, /mp/ camp, /nt/ ant, /nf/ Banff, /ntʃ/ Blanche, /tɵ/ eighth, /gd/ tagged, /zd/ caused, /bz/ cabs, /ðz/ bathes, /lt/ belt, /ltʃ/ filch, /lɵ/ wealth, /ln/ kiln, /ps/ lapse, /ɵs/ baths, /rk/ bark, /rv/ curve, /rtʃ/ march, /rl/ girl, /ft/ left, /mt/ dreamt, /nd/ sand, /nɵ/month, /ŋk/ link, /dɵ/width, /dʒd/ judged, /ʒd/ rouged, /dz/ beds, /ŋz/ things, /lk/ milk, /ldʒ/bilge, /ls/ else, /sp/ gasp, /ps/ sips, /rs/ farce, /rd/ hard, /rɵ/ hearth, /rdʒ/ barge, /pt/ stopped, /ɵt/ bathed, /mf/ nymph, /ntʃ/ pinch, /ns/ once, /ŋɵ/ length, /fɵ/ fifth, /vd/ lived, /md/ seemed, /gz/ tags, /lz/ fills, /lb/ bulb, /lf/ self, /lʃ/ welsh, /st/ test, /ks/ tax, /rp/ harp, /rg/ berg, /rz/ cars, /rm/ arm, /kt/ act, /ʃt/ washed, /mz/ seems, /ndʒ/ range, /nz/ bronze, /pɵ/ depth, /bd/ robbed, /ðd/ bathed, /ŋd/ longed, /vz/ lives.

-CCC clusters: /kst/ next, /rts/ hearts, /ŋks/ links, /mps/ glimpse, /mpt/ tempt, /rmɵ/ warmth, /lts/ belts, /rpt/ excerpt, /kɵ/ sixth, /rnt/ burnt, /rst/ thirst, /rld/ world, /ŋkt/ instinct, /dst/ midst, /lfɵ/ twelfth, /lst/ whilst, /nts/ sense,ants, /lks/ calx, /ŋst/ amongst, /lpt/ helped, /spt/ clasped, /lkt/ milked, /rkt/ worked, /rdʒd/ charged, /ndʒd/ changed, /nzd/ bronzed, /dzd/ adzed, /lbz/ bulbs, /rbz/ barbs, /skt/ asked, /lft/ elfed, /rft/ surfed, /mft/ triumphed, /ltʃt/ filched, /rtʃt/ marched, /ntʃt/ pinched, /lst/ repulsed, /rst/ forced, /nst/ sensed, /tst/ kibitzed, /pst/ lapsed, /lʃt/ welshed, /rʃt/ marshed, /rɵt/ earthed, /lps/ helps, /rps/ harps, /sps/ wasps, /rks/ works, /sks/ asks, /mpt/ tempt, /sts/ tests, /pts/ crypts, /ldz/ holds, /rdz/ cards, /ndz/ sands, /lmz/ elms, /rmz/ arms, /lnz/ kilns, /kts/ acts, /fts/ lifts, /lɵs/ tilths, /rɵs/ hearths, /nɵs/ months, /ŋɵs/ lengths, /tɵs/ eighths, /dɵs/ widths, /lfs/ Alf's, /rfs/ surfs, /mfs/ nymphs, /pɵs/ depths, /fɵs/ fifths, /lbd/ bulbed, /rbd/ barbed, /lvd/ delved, /rvd/ carved, /lmd/ filmed, /rmd/armed, /lnd/ kilned, /rnd/ turned, /rld/ curled, /ldʒd/ bilged, /rnz/ turns, /rlz/ curls, /lvz/ delves, /rvz/ carves, /rgz/ bergs, /rnt/ burnt.

- CCCC Clusters: /ksts/ texts, /mpts/ tempts, /rtst/ quartzed, /ŋkst/ jinxed, /mpst/ glimpst, /rpts/ excerpts, /kɵs/ sixths, /rsts/ thirsts, /ltst/ waltzed, /rldz/ worlds, /ŋkts/ instincts, /lfɵs/ twelfths, /ntst/ minced, /lkts/ mulcts.

2.4.1.3 JLN and Open Syllabication

Consonant clusters (with the exception of /N/ realizations + consonant) of words to be borrowed as LJ are subject to an appropriate vowel insertion according to environment in order to conform to Japanese open syllabic structure - this process is known as Open Syllabication (OS). According to Nomoto (1990) and Backhouse (1994), current OS is characterized by an *o* insert placed after *t/d*, with an *i* insert placed after *tʃ/dʒ*[8]. An *ɯ* insert is introduced after all other consonants.

[t, d] + [o] insert: **AE[**bæ:t**] (Bart) > J[**ba:to**]** **AE[**fɔ:d**] (ford) > J[**ɸo:do**]**

[tʃ,dʒ] + [i] insert: **AE[**bi:tʃ**] (beach) > J[**bi:tʃi**]** **AE[**peldʒ**] (page) > J[**pʰe:dʒi**]**

All other consonants + [ɯ] insert: AE[rals**] (rice) > J[**raisɯ**]**
AE[pʌzl**] (puzzle) > J[**pʰazɯrɯ**]**

(08) Open Syllabication rules

[8] Additionally [ʒ] (such as the consonant quality found in words of French origin such as camouflage, rouge, beige) is subject to both [i] and [u] inserts. Archaic inserts such as [i] inserts after [k] are also covered, but are outside the scope

2.4.2 Germinate Formation

Germinate Formation (GF) and assimilation are both processes involving a doubling of consonants. However, the two processes at work are distinct. The germinate Q (the moraic non-nasal) corresponds to the first of a sequence of two identical non-nasal consonants (Akamatsu 1997:265), formed in environments noted below.

2.4.2.1 Consonant assimilation in English

Assimilation can occur, just as in continuous speech, word-internally. Mannell and Cox (2000:11-13) note this often takes place in compound words formed from root + affix. Assimilation takes place in the following environments: (i) with alveolar consonants to a bilabial place of articulation before labials (e.g. [gʊbbaɪ] 'goodbye', [tæbpɔl] 'tadpole'). (ii) alveolar consonants to a velar place of articulation before velar consonants (e.g. [sɪkkɔm] 'sitcom'). (iii) alveolar fricatives to a palato-alveolar place of articulation before /ʃ/ and /j/ (e.g. [gla:ʃʃᵽp] 'glass shop'). (iv) alveolar stops and a following /j/ merging to form an affricate (e.g. [ᵽɪʤɛloʊkeɪk] 'old-yellowcake').

2.4.2.2 JLN Germinate Formation

Japanese also possesses assimilation in SJ/NJ words such as /ʃiQpai/ 'shippai (failure)', /haQʧaku/ 'hatchaku (departures/arrivals)', /iQkjuu/ 'ikkyu (first rate)', as well as the LJ words /kiQzu/ 'kids' and /guQzu/ 'goods'. However, GF differs from assimilation in that, whereas two differing sounds approach similar quality in assimilation, in GF a new germinate is inserted between a consonant and it's preceding stressed lax vowel, identical to that consonant. While both these processes are known as 'sokuon' in Japanese linguistics media, their functions greatly differ, and both additionally possess differing environments of presence.

Germinate Formation is found in somewhat differing environments in SJ and LJ. Kohmoto (1970) notes consonant assimilation (notated as /Q/) occurs in the following positions: (1) medially as /Qp/ /siQpai/ 'failure', /Qts/ /iQtsui/ 'a pair', /Qt/ /iQtou/ 'first class', /Qʧ/ /haQʧaku/ 'arrival and departure', /Qʃ/ /iQʃo/ 'together', /Qs/ /toQsani/ 'suddenly', /Qk/ /roQkai/ 'sixth floor', /Qpj/ /haQpjaku/ 'eight hundred', /Qkj/ /iQkjuu/ 'first rate'. However, the present author notes there are additional unique occurrences of consonant assimilation in JLN. Specifically, /Qp/ /gjaQpu/ 'gap', /Qb/ /weQbu/ 'web', /Qt/ /pokeQto/ 'pocket' /hiQto/ 'hit', /Qd/ /reQdo/ 'red', /Qk/ /cheQku/ 'check', /Qg/ /bosutoN baQgu/ 'Boston bag', /Qts/ /kjaQtsu/ 'cats', /woQʧi/ 'watch', /Qʤ/ /eQʤi/ 'edge', /Qh/ /baQha/ 'Bach' (personal name) /sutaQhu/ 'staff', /Qz/ /guQzu/ 'goods', /Qʃ/

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of the present study's focus of contemporary JLN.

/Qr/ baQku doQropusu/ 'backdrops' no examples of /Qm/ or /Qn/ are known to the author. Additionally, consonant + semi-vowel combinations are also targets of assimilation. Some concrete examples are /Qkj/ /haN soQkju/ 'Han Seok Kyu' (personal name), /Qhj/ /bjuQhyaa/ 'Karl Bucher' (personal name). No examples of /Qpj/, /Qbj/, /Qtj/, /Qdj/, /Qgj/, /Qrj/, /Qmj/, /Qnj/, /Qkw/ or /Qgw/ were found by the present study.

Variously covered by Backhouse (1996), Kato (1988:62), Kawarazaki (Nihongo 36:46), the Japan Foundation (1997:79), Mitamura (1985), Nomoto (1994) and Katayama (1998:74), the present study draws it's model from a framework of Katayama's suggestion of two positions for GF, and the environments suggested in the above works.

GF is expressed in the following forms: (i) word-final germination (when a consonant follows a lax vowel in word-final position in the source language: before p (pj), t, k (kj), ʃ, ts, ʧ, h(hj), b, d, g, ʤ. Note /s/ (/kiQsu/ 'kiss') exists, but is extremely rare.) and (ii) medial-germination (when the consonant follows a stressed lax vowel: before p (pl), t, k (kl, ks), s (sl), ʃ) exist. Additionally only one GF can occur in one word/morph.

(1) Word-final GF:
Stressed lax vowel + non-nasal/glide/liquid consonant:

Examples:	**p**	/gjaQpu/ **'gap'**, /raQpu/ **'lap'**
	t	/pokeQto/ **'pocket'**, /hiQto/ **'hit'**
	k (kj)	/kiQku/ **'kick'**, /haN soQkyu/ **'Han Seok Kyu'**
	ʃ	/fiʃQu/ **'fish'**, /meQʃu/ **'mesh'**
	ts	/kjaQtsu/ **'cats'**, /gaQtsu/ **'guts'**
	ʧ	/woQʧi/ **'watch'**, /sukeQʧi/ **'sketch'**
	h,ç (hj)	/baQha/ **'Bach'**, /zuriQçi/ **'Zurich'**, /bjuQhjaa/ **'Karl Bucher'**
	b	/weQbu/ **'web'**, /noQbu/ **'knob'**
	d	/**r**eQdo/ **'red'**, /**h**eQdo/ **'head'**
	g	/bosutoN baQgu/ **'boston bag'**, /doQgu/ **'dog'**
	ʤ	/eQʤi/ **'edge'**, /baQʤi/ **'badge'**

(2) Word-medial GF:
Stressed lax vowel + non-nasal/glide/liquid consonant

Examples:	**p (pl)**	/kaQpuru/ **'couple'**, /peQpaa/ **'pepper'**
	t	/moQtoo/ **'motto'**, /hiQtaa/ **'hitter'**
	k (kl, ks)	/taQkuru/ **'tackle'**, /riraQkusu/ **'relax'**
	s (sl)	/eQsei/ **'essay'**, /haQsuru/ **'hussle'**
	ʧ	/kjaQʧaa/ **'catcher'**, /kiQʧiN/ **'kitchen'**
	ʃ	/paQʃoN/ **'passion'**, /adomiQʃoN/ **'admission'**
	h	/ʃaQhuru/ **'shuffle'**, /waQhuru/ **'waffle'.**

(09) Germinate Formation rules

2.4.3 Vowel Naturalisation

There are far more vowel sounds in English than JLN (the vowel inventory of which is identical to SJ/NJ), meaning that most AE vowels converge to a JLN vowel phoneme or it's allophonic realization. This section details the vowel phonemes of AE and JLN, and related Vowel Naturalisation (VN) rules.

2.4.3.1 Monophthongs in AE and JLN

AE (12 vowels) possesses greater variety of vowel quality when compared to Japanese (5 vowels). These vowels are treated by VN rules to converge into the smaller number of JLN vowels.

The following section details each AE and JLN vowel phoneme, and the related JLN naturalisation rules. AE vowel phonemes are noted by 'AE', and JLN by 'J' before the phoneme '//'. Phonetic realizations are noted in '[ ]', with bracketed AE speech sounds being those proposed by Clark as described by Mannell and Cox (2000).

2.4.3.1 (1) Front Vowels of AE/JLN

AE/i/, realized as [i(i:)], is present in [si:zən] 'season', [tri:] tr*ee*, [i:mju:] 'emu'.

AE/I/, realized as [ɪ(ɪ)], is present in [wɪmən] 'women', [kɪk] 'k*i*ck', [brɪzbən] 'Br*i*sbane'.

AE/ɛ/, realized as [ɛ(e)], is present in [tɛmpt] 't*e*mpt', [roʊzɛlə] 'roz*e*lla', [kɛlpi:] 'k*e*lpie'.

AE/æ/, realized as [æ(æ)], is present in [mæn] 'm*a*n', [ku:nəbærəbræn] 'Coonab*a*rabr*a*n'.

J/i/ realized as [i] is present in [ʃidonʲi:] 'Sydney' , [mʲi:to pʰai] 'meat pie', [iŋkɯ] 'ink', devoiced between voiceless consonants/after after a voiceless consonant and before a pause as [i̥].

J/e/ realized as [e] is present in [emerarɯdo] 'emerald', [eʒʒi] 'edge'.

1) AE /i/ (/i:/) [i]	**> J/i/ [i:] AE[tin] (teen) J[ti:ñ]**
2) AE /ɪ/ [ɪ]	**> J/i/ [i] AE[sɪdni:] (Sydney) J[(s/ʃ)idonʲi:]**
	k,s,t,h,p_ k,s,t,h,p
	k,s,t,h,p_# [i꜀] AE[kɪk] (kick) J[ki꜀ kkɯ]
3) AE /ɛ/ [ɛ]	**> J /e/ [e] AE[ɛdʒ] (edge) J[eddʒi]**
4) AE /æ/ [æ] k_	**> J /kj/ [kja] AE[kæʃ] (cash) J[kjaʃʃɯ]**
g_	**J /gj/ [gja] AE[gæləksi] (galaxy) J[gjarakɯʃi:]**
	all others J/a/ AE[pærəmæta:] (Parramatta) J[pʰaramata:]

(10) Front vowel JLN rules

2.4.3.1 (2) Central Vowels of AE/JLN

Central vowels are some of the most problematic of all vowels due to AE vowel neutralization and the lack of, excluding /a/, correlating similar central vowels in Japanese.

AE/ɜ/, realized as [ɜ(ɜ:)], is present in the words [wɜ:k] 'work', [bɜ:k] 'Bourke'.

AE/ʌ/, realized as [ʌ(ɐ)], is present in the words [gʌnəda] 'G*u*nnedah', [brʌmbi] 'brumby'.

AE/a/, realized as [a(ɐ:,ɑ)], is present in [stɛdfast] 'steadfast', [la:f] 'l*au*gh'.

AE/ə/, realized as [ə(ə)], is present in the words [dʒənoʊlən] 'Jenolan', [fətᵇgrəfə] 'photographer'. Additionally, the long vowel [ə:] as in AE [fa:ðə:] 'father' is realized as J[a:].

Bernard (1991:24) notes the preference within AE (in comparison with other varieties of English) for the central indeterminate vowel /ə/ to be selected in unfully stressed syllables in the place of a more unneutralized one of more positive character. "Electric" [i'lɛktrɪk] > [ə'lɛktrɪk]. While both may exist in AE (for example *ferment* [fɛment] and [fəment]), a preference is given to the latter, as well as some examples existing where only the indeterminate vowel is possible ("roses" [roʊzəz]). This has implications for JLN naturalisation performance in that, while Nomoto (1990) suggests [ə] > [a], that the speaker may defer to L1 knowledge (morphs, spelling) in some cases, rather than the default [a].

J/a/ realized as [a] found in the example [adere:do] 'Adelaide'.

1) AE/ɜ/ (/ɜ:/)[ɜ]	**> J/a/**	**AE[**wɜ:k**] (work) J[**wa:kɯ**]**
2) AE/ə/ [ə]	**> J/a/**	**AE[**əbaʊt**] (about) J[**abaɯto**]**
		AE[ətÞmɪk**] (atomic) J[**atomikkɯ**][9]**
3) AE /ʌ/ [ʌ]	**> J/a/**	**AE[**dʌbɔ:**] (Dubbo) J[**dabo:**]**
4) AE/a/ (/ɐ:/) [a]	**> J/a/**	**AE[**pa:k**] (park) J[**pʰa:kɯ**]**

(11) Central vowel JLN rules

2.4.3.1 (3) Back Vowels of AE/JLN

AE/u/, realized as [u(ʉ:)], is present in [ʧu:z] 'choose', [ku:nəbærəbræn] 'Coonabarabran'.

AE/ʊ/, realized as [ʊ(ʊ)], is present in [lʊk] 'look', [wʊləməlu:] 'Woolloomooloo'.

AE/ɔ/, realized as [ɔ(o:)], is present in [hɔd] 'horde', [mɔri:] 'Moree'.

AE/Þ/, realized as [Þ(ɔ)], is present in [pÞmi:] 'Pommy', [ʤilÞŋ] 'Geelong', and /Þ˜/ in [bÞ˜n vɔja:ʒ] bon voyage.

J/ɯ/ realized as [ɯ], devoiced between voiceless consonants/after a voiceless consonant and before a pause as [ɯ̥] as in [iŋkɯ̥] 'ink' and [daɯñ] 'down'.

1) AE/u/ (/u:/) [u]	> J/u/ [ɯ:]	**AE[**tru:mən**] (Truman) J[**torɯ:mañ**]**
2) AE/ʊ/ [ʊ]	> J/u/ [ɯ]	**AE[**lʊk**] (look) J[**rɯkkɯ**]**
		k,s,t,h,p_ k,s,t,h,p
		k,s,t,h,p_# [ɯ̥**] AE[**ɛkspɾɛs**] (express) J[**ekkɯ̥ sɯ̥ pɯɾessɯ̥**]**
3) AE/o/ X Cultivated AE only		
4) AE /ɔ/ [ɔ]	> J/o/ [o:]	**AE[**bɔ:də:**] (border) J[**bo:da:**]**
4) AE/Þ/ [Þ]	> j/o/ [o]	**AE[**pÞmi:**] (pommy) J[**pʰomi:**]**
5) AE/o/ X Cultivated AE only		

(12) Back vowel JLN rules

[9] May defer back to AE spelling/morpheme knowledge as noted above in 2.4.3.1 (2)

2.4.3.1 (4) Rising Diphthongs of AE

General AE has five rising diphthongs (Mitchell and Delbridge 1965) (Mannell and Cox 2000), however diphthongs are not found in Japanese (Akamatsu 1997[10]). Instead, combinations of individual vowels form the surrogates in JLN naturalisation.

Hirasaka & Kamata (1984) note some shift in the naturalisation of diphthongs in Japanese exists. The following sounds can be easily translated into JLN: E[ɔɪ] > J[oi], E[aʊ] > J[aɯ], E[aɪ] > J[ai], E[ɪə] > J[ia], E[ʊə] > J[ɯa], E[ɛə] > J[ea]. However, some shift in treatment can be seen in E[eɪ] > J[eɪ] (innovative) and J[e:] (conservative), E[oʊ] > J[oɯ] (innovative) and J[o:] (conservative).

AE/eɪ/, realized as [eɪ(æɪ)], is present in the words [seɪm] 'same', [ɒstreɪljə] 'Australia'.

AE/aɪ/, realized as [aɪ(ɑe)], is present in the words [baɪ] 'buy', [bɒndaɪ] 'Bondi'.

AE/aʊ/, realized as [aʊ(æɔ)], is present in the words [taʊn] 'town', [haʊs] 'house'.

AE/oʊ/, realized as [oʊ(əu, əʊ)], is present in the words [ʤoʊn] 'Joan', [bɛndɪgoʊ] 'Bendigo'.

AE/ɔɪ/, realized as [ɔɪ(ɔɪ, oɪ)], is present in the words [ɔɪstə] 'oyster', [pɔɪzən] 'poison'.

1) AE/eɪ/ [eɪ]	**> J[ei]**	**>[e:]**	**AE[peɪdeɪ] (pay day) J[pʰeidei/de:de:]**
2)AE/aɪ/ [aɪ]	**> J[ai]**		**AE[baɪ] (buy) J[bai]**
3) AE/aʊ/ [aʊ]	**> J[aɯ]**		**AE[haʊs] (house) J[haɯsɯ]**
4) AE/oʊ/ [oʊ]	**> J[oɯ]**	**>[o:]**	**AE[bɛndɪgoʊ] (Bendigo) J[bendigo:]**
5) AE/ɔI/ [ɔɪ]	**> J[oi]**		**AE[ɔɪstəː] (oyster) J[oisɯta:]**

(13) Rising diphthong JLN rules

2.4.3.1 (5) Centering Diphthongs

General AE has five centering diphthongs, with no equivalents found in Japanese. Instead, combinations of individual vowels form the surrogates in JLN.

AE/ɪə/, realized as [ɪə(ɪə)], is present in the words [ɛnʤənɪə] 'engineer', [pɪə] 'pier'.

[10] Akamatsu (1994: 14) notes no diphthongs exist in Japanese. The present study followed Akamatsu's stance here, and feels students would produce better vowel duration if they consider a diphthong must be lengthened longer in JLN than in AE.

AE/ɛə/, realized as [ɛə(e:)], is present in the words ([hɛə] 'hair', [fɛə] 'fair'.

AE/ɔə/ only being found in cultivated English.

AE/ʊə/, realized as [ʊə(ʊə)], is present in the words [pjʊə] 'pure', [tʊə] 'tour'.

1) AE/ɪə/ [ɪə] > J [i(j)a]AE[gɪə] (gear) J[gia] **2) AE/ɛə/ [ɛə] > J [e(j)a]AE[fɛə] (fair) J[ɸea]** **3) AE/ʊə/ [ʊə] > J [ɯa] AE[kjʊə] (cure) J[kjɯa]** 4) **AE /ɔə/** X Cultivated AE only

(14) Centering diphthong JLN rules

2.4.4 Consonant Naturalisation

Before dealing with the specifics of Consonant Naturalisation (CN), it is first necessary to identify the phonemic inventory, phonetic details and restrictions in distribution.

JLN phonemes themselves, along with their combinations, have experienced significant expansion throughout the 20th century (see Section 2.3.3). Towards identifying the most current phonemic inventory, the present work examined and collated a body of over 20 works that either (i) identified *katakana* character inventories, or (ii) identified JLN rules. These works were drawn from Japanese language educational materials, Japanese linguistics materials, and dictionaries (general, foreign language, *katakana* loanword, and character varieties).The results are found in Table 11, with the full list of acknowledged *katakana* units found in Appendix 2: Acknowledged *Katakana* Units.

These units represent the sounds identified by the over 20 works above as existing in modern JLN. In the majority of cases, these sounds are present in already existing LJ lexical items; however, in some cases, lexical items were not identifiable by the current study, due to corresponding sound structures not being present in the main languages from which LJ most often borrows. This is not to say the units themselves are invalid, but merely that while languages exist that possess the speech sounds correlating with the input required to produced these units, no lexical borrowings have yet been made and/or recognised as lexical units.

JLN contains an expanded phonemic inventory compared to SJ and NJ. Consonants are the key area where dramatic expansion of phonemes and change of distribution is seen. NJ/SJ has only the consonants /p/, /b/, /t/, /d/, /k/, /g/, /ch/, /ʤ/, /h/, /s/, /z/, /m/, /n/, /N/, /r/, /j/, /w/ and the consonant + semi-vowels /pj/, /bj/, /kj/, /gj/, /hj/, /mj/ and /rj/. Conversely, JLN has (i) unique phonemes in /ts/, /ʃ/, and /tj/, /dj/, /kw/ and /gw/. (ii) Expanded environments in /t/, /d/, /ʧ/, /ʤ/, /s/, /z/, /j/, /w/ and /nj/, and (iii) the same environments in the phonemes /p/, /b/, /k/, /g/, /h/, /m/, /n/, /r/ and /bj/, /pj/, /kj/, /gj/, /hj/, /mj/ and /rj/.

With the units and implied phonemes now identified (see (15) overleaf), each AE/JLN consonant class (stops, fricatives, affricates, nasals and combined glides/liquids) is next introduced by means of phonemic inventory, phonetic details and distribution. JLN rules (both CV and IV varieties are delineated) are then presented for each class in the following sections. Now, while some linguists follow the alveolo-palatal allophones ([ɕ], [tɕ] and [dʑ]) rather than palato-alveolar symbols for the alveolar phonemes (/s, t, z, d/), the current study uses the later since they are widely accepted.

(15) INNOVATIVE AND CONSERVATIVE MORAIC UNIT INVENTORY

ア	イ	ウ	エ	オ
a	**i**	**u**	**e**	**o**
カ	キ	ク	ケ	コ
ka	**ki**	**ku**	**ke**	**ko**
サ	シ	ス	セ	ソ
sa	**shi**	**su**	**se**	**so**
	シィ			
	si*11			
タ	チ	ツ	テ	ト
ta	**chi**	**tsu**	**te**	**to**
	ティ	トゥ		
	ti	tu		
ナ	ニ	ヌ	ネ	ノ
na	**ni**	**nu**	**ne**	**no**
ハ	ヒ	フ	ヘ	ホ
ha	**hi**	**hu**	**he**	**ho**
ファ	フィ	フ	フェ	フォ
fa	**fi**	**fu**	**fe**	**fo**
マ	ミ	ム	メ	モ
ma	**mi**	**mu**	**me**	**mo**
ラ	リ	ル	レ	ロ
ra	**ri**	**ru**	**re**	**ro**
ガ	ギ	グ	ゲ	ゴ
ga	**gi**	**gu**	**ge**	**go**
ザ	ジ	ズ	ゼ	ソ
za	**zi**	**zu**	**ze**	**zo**
	ジィ*12			
	zi			
ダ	(ヂ)	(ヅ)	デ	ド
da			**de**	**do**
	ディ	ドゥ		
	di	du		
バ	ビ	ブ	ベ	ボ
ba	**bi**	**bu**	**be**	**bo**
パ	ピ	プ	ペ	ポ
pa	**pi**	**pu**	**pe**	**po**
ヴァ	ヴィ	ヴ	ヴェ	ヴォ
va	vi	vu	ve	vo
ワ	ウィ	ウ	ウエ	ウォ
wa	wi	wu	we	wo
	ッ	ー	ン	
	Q	-	**N**	

ヤ	ユ	イェ*13	ヨ
ya	**yu**	ye	**yo**
キャ	キュ		キョ
kya	**kyu**		**kyo**
シャ	シュ	シェ	ショ
sha	**shu**	she	**sho**
チャ	チュ	チェ	チョ
cha	**chu**	che	**cho**
テャ	テュ		テョ*14
tya	tyu		tyo
ニャ	ニュ	ニェ	ニョ
nya	**nyu**	**nye**	**nyo**
ヒャ	ヒュ		ヒョ
hya	**hyu**		**hyo**
フャ	フュ		フョ*15
fya	fyu		fyo
ミャ	ミュ		ミョ
mya	**myu**		**myo**
リャ	リュ		リョ
rya	**ryu**		**ryo**
ギャ	ギュ		ギョ*16
gya	**gyu**		**gyo**
ジャ	ジュ	ジェ	ジョ
ja	**ju**	**je**	**jo**
ビャ	ビュ		ビョ
bya	**byu**		**byo**
ピャ	ピュ		ピョ
pya	**pyu**		**pyo**
ヴャ	ヴュ		ヴョ*17
vya	vyu		vyo

クァ	クィ	クェ	クォ*18
kwa	**kwi**	**kwe**	**kwo**
ツァ	ツィ	ツェ	ツォ
tsa	**tsi**	**tse**	**tso***19
グァ	グィ	グェ	グォ
gwa	gwi	gwe	gwo*20

2.4.4.1 (1) Stops

Stops are made up of base consonants, as well as consonant + semi-vowel: CjV, and CwV, which are only found as JLN Stop consonants, and unseen in modern SJ/NJ. Specifically, stop consonants are made up of the sounds noted in (16) below.

Stops	Voiceless	Voiced
AE	p t k	b d g
JLN	p t k	b d g

(16) AE and JLN stops

AE/p/ realized as [p] as in [pæn] 'pan', [pɛn] 'pen', and [pʰ] (aspirated) before stressed vowels or diphthongs in the same syllable as in [pʰeɪ] 'pay'.

AE/b/ realized as [b] as in [bæt] 'bat', [bɛt] 'bet', and [b̥] word finally as in [tʰæb̥] 'tab', and before a voiceless or devoiced obstruant as in [tʰæb̥ z̥] 'tabs'.

AE/t/ realized as [t] as in [teɪl] 'tale', [ɾ] inter-vocalically as in [raɪɾə] 'writer', and [tʰ] (aspirated) before stressed vowels or diphthongs in the same syllable (pay [tʰæb̥]).
AE/d/ realized as [d] as in [deɪl] 'Dale', [pædək] 'paddock', [raɪdə] 'rider', and [d̥] word finally as in [dæd̥] 'dad', and before a voiceless or devoiced obstruant as in [dæd̥ z̥] 'dads'.

Mannell and Cox (2000) note AE/t/ and /d/ are prone to deletion in inter-consonant environments, as in [dərɛklɪ] 'directly' and [hænfʊl] 'handful', and when the following consonant belongs to another word [nɛks dæl] 'next day'.

AE/k/ realized as [k] as in [kelm] 'came', [ɛʧu:kə] 'Echuca'., and [kʰ] (aspirated) before stressed vowels or diphthongs in the same syllable (pay [kʰɪn] 'kin').

AE/g/ realized as [g] as in [gelm] 'game', [gʌndəgal] 'Gundadai', and [g̥] word finally as in [gæg̥] 'gag', and before a voiceless or devoiced obstruant as in [gæg̥ z̥] 'gags'.

J/p/ realized as [pʰ] initially or [p] medially, [pj] before /i,j/ as in [pʰa:sɯ] 'Perth', [ʃiɲapo:ru] 'Singapore', [pjiʒiñ] 'pidgin', [pʰɯrinsɯ] 'prince', [pʰenrjisɯ] 'Penrith'.
J/pj/ realised before /a,u,e,o/ as in [pjɯa] 'pure', although no existing LJ lexical examples of /pja/, /pye/ or /pyo/ were identified by the current study.

J/b/ realized as [b], [ß] medially (uncommon) and [bj] before /i,j/, as in [baiagɯra] 'Viagra', [bandaba:gɯ] 'Bundaburg', [bakkɯappɯ] 'backup' and [bambaɾji:] 'Bunbury', [bjiʒinesɯ] 'business'[bjikɯtoria] 'Victoria', [ʃimboɾɯ] 'symbol', [ibɯ] 'eve', [be:sɯ] 'base'and [be:ɾɯ] 'vail', and [bokjabɯraɾji:] 'vocabulary' and [bo:da:] 'border'.
J/bj/ realized before /a,u,e,o/ as in [bjiɯ:] and 'view'[bjɯ:tji:] 'beauty', although no existing LJ lexical examples of /bja/, /bje/ or /bjo/ were identified by the current study.

J/t/ realized as [th](word initial)/[t] (medially) before /a,e,u,o/, and [tj] before /i,j/. Examples include [tha:miɲaɾɯ] 'terminal', [maɾɯtji] 'multi-(talented)', [thɯ:rakkɯ] 'Turack', [anti:kɯ] 'antique', [theɾitoɾji:] 'territory', [thore:sɯ] 'trace'.
J/tj/ realized before /a, u, o/ as found in [tjɯ:ba] 'tuba', although no existing LJ lexical items containing /tja/ or /tjo/ were identified by the current study.

J/d/ realized as [d] as in [dansɯ] before /a,e,o,u/ and [dj] before /i,j/ found in the words [da:wiñ] 'Darwin', [djiŋgo] 'dingo', [medjikaɾɯ] 'medical', [phadɯ dɯ:] 'pas de deux dance step' (French), [dɯ:doɾɯ] 'doodle', [do:ɲatsɯ] 'donuts'.
J/dj/ realized before /a,u,o/ as in [djɯetto] 'duet', [phɯrodjɯ:sa:] 'producer', although no existing LJ lexical items containing /dja/ or /djo/ were identified by the current study.

J/k/ realized as [kh] initially or [k] medially before /a,u,e,o/, [kj] before /i, j/ as in [khakadɯ] 'Kakadu', [kjiddo] 'kid', [khɯ:ra:] 'cooler', [khetʃappɯ] 'ketchup sauce', [khoppɯ] 'cup', [kjambera] 'Canberra'.
J/kj/ realized before /a,u,o/ as in [kjambera] 'Canberra', [kjɯ:to] 'cute', [kjonsañ nando:] 'Kyongsang Namdo (region)'.
J/kw/ realized before /a,i,u,e,o/, however is weakened before /ɯ/ to become [kɯ]. Examples are seen in [kwaɾɯtetto/ kɯaɾɯtetto] 'quartet', [kwi:ñ/ kɯi:ñ] 'queen', [kweswtʃoñ ma:kɯ/kɯeswtʃoñ ma:kɯ] 'question mark', [kwo:taɾji:/kɯo:taɾji:] 'quarterly'.

J/g/ realized as [g] before vowels other than /i/, [gj] before /i,j/ and [ŋ] medially. Examples include [gesɯto] 'guest', [gjizɯbo:ñ] 'Gisbourne', [ʃinŋapo:ɾɯ] 'Singapore', [ge:tosɯ] '(Bill) Gates', [ʃiŋŋɯ] 'sing', [goɾjira] 'gorilla'.
J/gj/ realized before /a,u,o/ as found in [gjarakɯʃi:] 'galaxy', although no existing LJ lexical items containing /gju/ or /gjo/ were identified by the current study.
J/gw/ realized before /a,i,u,e,o/, however is weakened before /ɯ/ to become [gɯ]. Examples include [p'aragwai] 'Paraguay', although no existing lexical items containing /gwi/, /gwe/ or /gwo/ were identified by the current study.

1) AE /b/,/v/ _j [bj]/[vj] > J/bj/ _a, u, e, o [bj] **AE[bju:tɪfəl] (beautiful) J[bjɯtiɸɯrɯ]**
-voice obstruant_/_# [b꜀ /v꜀]>J/b/_a,u,e,o #_[bʰ], _#_ [b] **AE[bʰæŋ] (bang) J[baŋgɯ]**
All others [b]/[v] _i [bj] **AE[bɪn] (bin) J[bjiñ]**

2) AE /p/ _j [pj] > J/pj/ _a, u, e, o [pj] **AE[pjuə] (pure) J[pjɯa]**
_+stress V/dipthong** [pʰ] J/p/ _a,u,e,o #_[pʰ], _#_ [p] **AE[pɛn] (pen) J[pʰeñ]**
All others [p] _i [pj] **AE[pi:s] (peace) J[pji:sɯ]**

3) AE /t/ _j [ty] > J/tj/ _a, u, o > J/t/ [ʧ] **AE[tju:n] (tune) J[(tj/ʧ)ɯ: ñ]**
_+stress V/dipthong** [tʰ] > J/t/ _a, e, o #_[tʰ], _#_ [t] **AE[tɛn] (ten) J[tʰeñ]**
All others [t] _i [tj] >[ʧ] **AE[tim tæm] (Tim Tam) J[(t/ʧ)imɯ tamɯ]**
_u #_[tʰ], _#_ [t] >[ts] **AE[tu:l] (tool) J[(tʰ/ts)ɯrɯ]**

4) 4) AE /d/ _j [dj] > J/dj/ _a, u, o > J/ʤ/ **AE[dju:ɛt] (duet) J[djɯ:etto]**
-voice obstruant_/_# [d꜀] > J/d/ _a, e, o #_[dʰ], _#_[d]**AE[dæʃ] (dash) J[daʃʃɯ]**
All others [d] _i [dj] > #_[ʤ], _#_ [ʒ] **AE[mɪdi:] (middy) J[middi:]**
u #_[dʰ], _#_[dʰ] >#_[ʤ], _#_ [z] **AE[du:m] (doom) J[dɯ:mɯ]**

5) AE /k/ _w [kw] > J/kw/ _a, (i, u, e, o) > [k + ɯ] **AE[kwɒk] (Kwok) J[k(w/ɯ)okkɯ]**
_j [kj] J/kj/ _a, u, e, o **AE[kæmbɛl] (Cambell) J[kjamberɯ]**
+stress V/dipthong** [kʰ] > /k/ #[kʰ], _#_[k] **AE [ku:mʌ] (Cooma) J[kʰɯ:ma]**
All others {k}

6) 6) AE /g/ _w [gw] > J/gw/ _a (I,u, e, o) > [g + ɯ] **AE[gwatɛma:lə] (Guatemala) J[g(w/ɯ)atemara]**
_j [gj] > J/gj/ _a, u, e, o **AE[gæp] (gap) J[gjappɯ]**
-voice obstruant_/_# [g꜀] >J/g/ #_[gʰ], _#_[g] **AE[gɛt] (get) J[getto]**
All others [g]
** in same syllable

(17) Stop JLN rules

2.4.4.1 (2) Affricates

Affricates are made up only of the base consonants noted in (18) below.

Affricates	Voiceless	Voiced
AE	ʧ	z ʤ
JLN	ts ʧ	z ʤ

(18) AE and JLN affricates

AE/ʧ/ realized as [ʧ] as in [ʧalm] 'chime', [ɛʧu:kə] 'Echuca'.

AE/z/ realized as [z] as in [zil] 'zeal', [roʊzɛlə] 'rosella'.

AE/ʤ/ realized as [ʤ] as in [ʤoʊk] 'joke', [ʤʌmbʌk] 'jumbuk'.

Bernard (1991:25) draws our attention to AE words containing the affricate+glide sequences /tj/ and /dj/. *Tu*lip, *du*ring, *tu*ne, *du*rable, E*du*cate, *du*ty, *tu*ition. AE speakers have the alternative of selecting either [tj] or [ʧ] in the case of tulip, tuition etc., and [dj] or [ʤ] in the case of durable, educate. Speakers, Bernard notes, have the option of selecting assimilated or full versions, or a share of both.

J/ts/ realized as [ts] before all vowels, as in [tsɯa:] 'tour', [ittsi: bittsi:] 'ittsy bittsy', [kʲabetsɯ] 'cabbage', [tsɯberɯkɯrʲiñ] tuberculin.

J/ʧ/ realized as [ʧ] before all vowels in [ʧainatawñ] 'Chinatown', [ʧi:zɯ] 'cheese', [ʧɯ:bɯ] 'tube', [ʧeko] 'Czechoslovakia', [ʧomɯsɯkʲi:] 'Chomsky.

J/ʤ/ realized as [ʤ] before all vowels, [ʒ] medially as in [ʤapañ] 'Japan', [bʲi:ʒi:zɯ] 'Bee Gees', [ʤɯ:sɯ] 'juice', [ʤeɲo:rañ] 'Jenolan', [ʤo:ʒia] 'Georgia', [arɯʒerʲia] 'Algeria'.

1) AE /ʧ/ [ʧ]	> J/ʧ/ _a, I, u, e, o [ʧ]	**AE[ʧalnə] (China) J[ʧaina]**
2) AE/ʤ/ [ʤ] AE/ʒ/ [ʒ]	> J/ʤ/_a, I, u, e, o [ʤ], _#_ [ʒ]	**AE[ʤɛnərelʃən] (generation)** **J[ʤenere:ʃoñ]**
3) AE [ts]	> J/ts/ _a, I, e, o [ts] >[tsɯ(+VOWEL)]	**AE[ltsi bltsi] (itsy bitsy)** **J[**ittsi: bittsi:**]**
	_u [ts]	**AE[kæts] (cats) J[**kjattsɯ**]**

(19) Affricate JLN rules

2.4.4.1 (3) Fricatives

Fricatives are made up of base consonants, as well as CjV consonant + semi-vowel combinations noted in (20) below.

Fricatives	Voiceless	Voiced
AE	f ɵ s ʃ h	v ð z ʒ
JLN	s ʃ h	z

(20) AE and JLN fricatives

AE/f/ realized as [f] as in [faIn] 'fine', [stɛdfast] 'steadfast'.
AE/v/ realized as [v] as in [vaIn] 'vine', [lʌvlIIst] 'loveliest', and [v̥] word finally or before voiceless/devoiced .obstruents as in [liv̥] 'leave'.

AE/ɵ/ realized as [ɵ] as in [ɵIn] 'thin', [ɜ:ɵ] 'earth'. Fujimoto (1988: 163) notes assimilation takes place with dental fricatives before the fricatives [s,z] as in [mʌnɵs] > [mʌns] ' months'.

AE/ð/ realized as [ð] as in [ðɛn] 'then', and [ð̥] word finally or before voiceless/devoiced obstruents as in [tið] 'teethe'. Assimilation occurs in the same environment as AE/ɵ/ above.

AE/s/ realized as [s] as in [sil] 'seal', [ðIs] 'this'.

AE/z/ realized as [z] as in [zil] 'zeal', and [z̥] word finally or before voiceless/devoiced obstruents as in [ðiz̥] 'these'.

AE/ʃ/ realized as [ʃ] as in [ʃoʊ] 'show', [ʃɔə] 'sure'.

AE/ʒ/ realized as [ʒ] as in [mɛʒə] 'measure', and [ʒ̥] word finally or before voiceless/devoiced obstruents as in [ru:ʒ] 'rouge'.

AE/h/ realized as [h] as in [hit] 'hit', [hi:lIəm] 'helium'.

J/s/ realized as [s] before all vowels, as in [sampaɯro] 'San Paulo', [sɯi:tʲi:] 'sweety', [sɯpo:tsu] 'sports', [semento] 'cement', [sofa:] 'sofa'.

J/z/ realized as [dz] word-initially and [z] word-medially before all vowels. [dzai:ɾɯ] 'Zaire', [dzippa:] 'zipper' (cf. conservative [ʤippa:]), [pɯrazɯma] 'plasma'.

J/ʃ/ realized as [ʃ] in all positions as in [ʃampɯ:] 'shampoo', [ʃi:pɯ] 'sheep', [ʃɯ:to] 'shoot', [ʃepa:do] shepherd (dog), [ʃoppʲiŋŋɯ] 'shopping'.

J/h/ realized as [h] before /a,e,o/, [ç] before /i, j/ in all AE/h/ naturalisations, and [ɸ] before all vowels in AE/f/ naturalisations. Examples include [hamʲiɾɯtoñ] 'Hamilton', [çippi:] 'hippy', [ɸɯra ɸɯ:pɯ] 'hoola hoop', [herʲikopɯta:] 'helicopter', [hoɲoɾɯɾɯ] 'Honolulu',

and [ɸairɯ] 'file', [ɸaʃʃoñ] 'fashion', [ɸikkɯʃoñ] 'fiction', [ɸɯrentʃi] 'French', [ɸenʃiŋŋɯ] 'fencing', [ɸo:bɯsɯ] 'Forbes',

/h_j/ realized before /a,u,o/ as in [bjirjihjɯsɯ] 'Billy Hughes' and [ɸjɯ:zɯ] 'fuse', although no existing lexical LJ examples of /hja/ or /hjo/ were identified by the current study.

1) AE /f/ _j [f]	> J /hj/_(a), u, (o)[ɸj]> J/hj/	**AE[**fju:tʃa:**] (future) J[**ɸjɯtʃa:**]**
All others [f]	J /h/_a,I,u, e,o [ɸ] > J /h/	**AE[**falta:**] (fighter) J[**(ɸ/h)aita:**]**
2) AE /v/ _j [v]	> J /bj/_(a, u, o)	
+ voice C_+voice C/_# [v꜀]	J /b/ _a,I,u,e,o [b] > J/b/	**AE[**valægrə**] (Viagra) J[**baiagɯra**]**
All others [v]		
3) AE /ɵ/	> J /s/ _a, u, e, o [s]	**AE[**spa:riŋ**] (sparring) J[**sɯpa:riŋŋɯ**]**
AE /s _i [s]	> [ʃ]	**AE[**ɵiŋk**] (think) J[**(s/ʃ)iŋkɯ**]**
4) AE /ð/+ voice C_+voice C/_# [ð꜀]	> J /z/ _a, u, e, o [dz]#_	**AE[**ðə**] (the) J[za]**
All others [ð]	[z]_#_	
AE /z/+ voice C_+voice C/_# [z꜀] _I [dz]	> [dʒ], _#_[ʒ]	**AE[**dzIpa:**] (zipper) J[**(dz/dʒ)ippa:**]**
All others [z]		**AE[**plæzma**] (plasma) J[**pʰɯrazɯma**]**
5) AE /ʃ/	> J /ʃ/ _a, I, u, e, o	**AE[**ʃɛrətən**] (Sheraton) J[**ʃeratoñ**]**
		AE[ʃæmpu:**] (shampoo) J[**ʃampɯ:**]**
6) AE/ʒ/ + voice C_+voice C/_# [ʒ꜀]	> J /dʒ/ _a, I, u, e, o [dʒ]	
All others [ʒ]	_#_[ʒ]	**AE[**kɔ:sa:ʒ**] (corsage) J[**kʰo(:)sa:ʒɯ**]**
7) AE /h/ _j	> J /hj/ _(a), u, (e, o) [hj]	**AE[hju:dʒ] (huge) J[hjɯ:dʒi]**
All others	J /h/ _a, e, o [h]	**AE[hæmIltən] (Hamilton) J[**hamirɯtoñ**]**
	_I [ç]	**AE[**hIp**] (hip) J[**çippɯ**]**
	_u [ɸ]	**AE[**hʊd**] (hood) J[**ɸɯddo**]**

(21) Fricative JLN rules

2.4.4.1 (4) Nasals

Nasals are made up of base consonants, as well as CjV consonant + semi-vowels noted in (22) below.

Nasals	Voiceless	Voiced
AE JLN		m n ŋ m n N

(22) AE and JLN nasals

AE/m/ realized as [m] as in [maɪl] 'mile', [gɪmpi] 'Gympie'.

AE/n/ realized as [n] as in [ni:t] 'neat', [mʌndʌlə] 'Mundulla'.
Mannell and Cox (2002) note that assimilation takes place with dental and nasal oral stops before dentals as in /tɛnə/ >[tɛn̪ə̪] 'tenth'.
AE/ŋ/ realized as [ŋ] as in [sɪŋ] 'sing', [ʤɪlɒŋ] 'Geelong'.

J/m/ realized as [m], [mʲ] before /i,j/ as in [makao] 'Macao', [mʲirɯkɯ] 'milk', [mɯ:sɯ] 'moose', [merodʲi:] 'melody', [mo:ta:] 'motor'.
J/mʲ/ realized before /a,u,o/ examples of which include [mʲamma:] 'Myanmar', [mʲɯ:ʒikkɯ] 'music' although no existing lexical LJ examples of /mjo/ were identified by the current study.

J/n/ realized as [ɲ] before /i,j/ (see /nʲ/ below for realisation before /j/) as in [ɲi:zɯ] 'needs' and [n] before all other vowels as in [naiɸɯ] 'knife', [nɯ:dorɯ] 'noodle', [nekɯtai] 'necktie', [no:berɯ] 'Nobel'.
/nʲ/ realized before /a,u,e,o/, as [ɲ] in [ɲɯ:] 'new', although no existing LJ lexical items containing /nja/, /nje/ or /njo/ were identified by the current study.

J/N/ ,the syllabic nasal, is realized as [n] before /t,d,ts,z,ʧ,ʤ,r,n/ as in [tʰento] 'tent', [sɯtenresɯ] 'stainless (steel)', [m] before /b,p,m,f,v/ as in [tʰorampetto] 'trumpet', [kʰorombʲia] 'Columbia', [mʲamma:] 'Myanmar' and [ŋ] before [k,g] as in [tʰaŋkɯ] 'tank', and as [ñ] word-finally, and before vowels/semivowels.

1) AE /m/ _j [mj]	> J/mj/ _a, u, e, o [mj]	**AE[mjænma:](Myanmar) J[mjamma:]**
all others [m]	J/m/ _a, u, e, o [m]	**AE[mʌmps] (mumps) J[mampɯsɯ]**
	_I [mj]	**AE[mi:t] (meat) J[mʲi:to]**
	_p,b, f, v /N/	**AE[gɪmp] (Gimp) J[gimpɯ]**
2) AE /n/ _j [nj]	> J/nj/ _a, u, e, o [nj]	**AE[nju:] (new) J[njɯ:]**
all others [n]	J/n/ _VOWEL [n]	**AE[noʊbɛl] (Nobel) J[no:berɯ]**
	_n_ [ɲ]	**AE[tæŋk] (tank) J[tʰaŋkɯ]**
3) AE/n/ _V [n]	> J /N/ _p, b, m [m]	**AE[dɪmpl] (dimple) J[dimpɯrɯ]**
AE/m/ _p, b, f, v [m]	_t,d,ts,z,ʧ,ʤ,r,n [n]	**AE[tɛnt] (tent) J[tʰento]**
	_ɲ [ɲ]	**AE[maŋnjan] (Mangyan) J[maŋɲan]***
	_k, g, (ŋ) [ŋ]	**AE[blɪŋk] (blink) J[bɯriŋkɯ]**
	_all others [ñ]	**AE[plñ] J[pʲiñ]**
4) AE /ŋ/ [#]	> J[ŋg (+VOWEL)]	**AE[sɪŋ] (sing) J[(s/ʃ)iŋgɯ]**
[ŋk]	J [ŋk(+VOWEL)]	**AE[ɵɪŋk] (think) J[(s/ʃ)iŋkɯ]**
[ŋg]	J [ŋg (+ VOWEL)]	**AE[sɪŋga] (singer) J[(s/ʃ)iŋga]**

* Rare in AE except for AE loanwords

(23) Nasal JLN rules

2.4.4.1 (5) Glides/Liquids

Glides/Liquids are made up of base consonants, as well as CjV consonant + semi-vowels noted in (24) below.

Glides/ Liquids	Voiceless	Voiced
AE		w l r j
JLN		w r j

(24) AE and JLN glides/liquids

AE/w/ realized as [w] as in [wu] 'woo', [wʊləməlu:] 'Woolloomooloo', and [w̥] following a voiceless stop as in [tw̥ ɪʧ] 'twitch'. Some AE dialects may use [ʍ] in differentiating witch and which.

AE/l/ realized as [l] as in [last] 'last', [koʊa:lə] 'koala', as [ɬ] (dark/velarized) before consonant/word final as in [mɪɬ] 'mill'.

AE/r/ realized as [r] as in [reɪn] 'rain', [pærəmætə] 'Parramatta', and as [r̥] following a

voiceless stop as in [trₒɪp] 'trip'.

AE/j/ realized as [j] as in [ju] 'you', [jærəwÞŋgə] 'Yarrawonga', and as [jₒ] following a voiceless stop as in [tjₒu:zdeɪ] 'Tuesday'.

J/r/ is recognized as [ɾ] before /a, ɯ, e, o/ and as [ɾj] before /i,j/ as in [ɾaibaɾɯ] 'rival', [ɾjizɯmɯ] 'rhythm', [ɾɯkkɯsɯ] 'looks', [ɾe:da:] 'radar', [ɾoketto] 'rocket.
J/r_j/ realized before /a,u,o/ found in the items [ɾjaotoñ hanto:] 'Laoton Peninsula', [bɯɾjɯsseɾɯ] 'Brussels', although no existing lexical LJ examples of /rjo/ were identified by the current study.

J/j/ realized as [j] before all vowels. Generally weakens before /i、 e/ to [i] as in [pʰo:jaŋko] 'Lake Poyan' , [i:sɯto] 'yeast', [jɯ:za] 'user', [iesɯ] 'yes', [jotto] 'yacht'.

J/w/ realized as [w] before /a/ as in [waido] 'wide', although before /i, ɯ, e, o/ weakens to become [ɯ] as in [ɯi:kɯdei:] 'weekday', [ɯ:rɯ] 'wool', [ɯeɾɯta: ɯe:to] 'welter weight', [ɯo:ta:] 'water', [kʰɯ ɯe:to] 'Kuwait'.

1) AE /r/ [r] _j[rj]	> J/rj/ _a, u, (o) [ɾj]	**AE[ljÞtÞn] (Laoton) J[ɾjaotoñ]**
/l/ [l] _j[lj]		
AE /r/ _voiceless stop_ [rₒ]	> J/r/ _a, u, e,o [ɾ]	**AE[lɪtl] (little) J[ɾitoɾɯ]**
all others [r]		
/l/ V,j,diphthongs_[l]	_i, j [ɾj]	**AE[læm] (lamb) J[lamɯ]**
C/#[+]		
2) AE /j/ voiceless stop_[jₒ]	> J /j/ _a, u, o [j]	**AE[jÞt] (yacht) J[jotto]**
All others [j]	_I, e [i(+VOWEL)]	**AE[jɛs] (yes) J[iesɯ]**
3) AE /W/ voiceless stop_[wₒ]	> J/W/ _a [w]	**AE[wul] (wool) J[ɯ:ɾɯ]**
All others[w/ʍ]	_i, u, e, o [ɯ]	**AE[wɪskÞnsən] (Wisconsin) J[ɯisɯkon(s/ʃ)iñ]**
		AE[wɛlta: welt] (welterweight) J[ɯeɾɯta: ɯe:to]

(25) Glide/Liquid JLN rules

2.5 Expected learner difficulties in JLN

2.5.1 Open Syllabication

Little research has been conducted regarding OS learner production - a process that does not exist in AE speaker's mother language, although Odlin (1989:122) notes a universal language preference for CV rather than CVC structures.

Study of ANU Japanese language student work and teacher journals highlights incorrect OS insert usage in written Japanese, and absence of some inserts in spoken Japanese. Theoretically speakers can do one of three actions when faced with an environment requiring OS: (i) produce the correct OS insert, (ii) produce an incorrect OS insert, or (iii) do not produce an insert.

The present study will therefore focus on testing the environments that OS is required in JLN, and whether AE speakers produce correct, hypercorrection items or leave the environment absent.

2.5.2 Germinate Formation

GF is another process limited to JLN. Previous studies by Akamatsu (1997), Aoki (1990) and Kawarazaki (1979) note a tendency for difficulty in *sokuon* (infering both NJ/SJ assimilation and JLN GF) by English and other non-native speakers.

Aoki (1990) and Kawarazaki (1979) note the incorrect (redundant/non-formation) use of *sokuon* can obstruct communication much more than it would in English, as seen in the redundant formations *[sɯpottsɯ] 'sports', *[orimpikɯ] 'Olympics' and *[nekko] 'cat'. Additionally, non-formation can also obstruct communication as in [kizzɯ] 'kids' and *[kizɯ] 'wound', [matto] 'mat' and *[mato] 'target'. Aoki and Kawarazaki highlight *sokuon* difficulties exist in non-native Japanese production. Theoretically speakers can do one of two actions when faced with an environment requiring OS: (i) produce a GF, (ii) do not produce a GF.

The present study will therefore focus on testing the environments GF is required in JLN, and presence/absence of this process in AE speaker production.

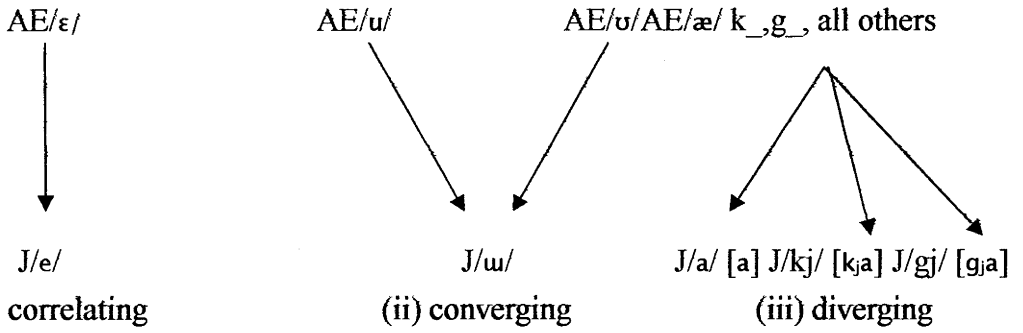
2.5.3 Vowel Naturalisation

VN and CN form the bulk of the focus of Japanese language segmental error literature. VN Errors can be sub-divided into vowel quality errors, and vowel quantity errors.

2.5.3.1 Vowel quality

Phonemes can naturalize in one of several ways. They can (i) correlate, where one

phoneme in AE equates to another in JLN; (ii) converge, where several AE phoneme equate to one in JLN; or (iii) diverge, where what is recognised as a single phoneme in AE becomes several distinct phonemes in JLN. Examples of these forms of naturalisation appear below in (26).



(26) Correlating, converging and diverging phonemes

The first factor of difficulty students must face is phonemic level vowel naturalisation, as suggested through informal study (including experience teaching and trainee teacher pedagogical diary entries) of student TL speech. Non-native speakers must select the correct phoneme, based on knowledge of JLN rules. The presence of incorrect items at this level may be caused by unfamiliarity with/incorrect acquisition of JLN rules, that is, a lack of awareness as to what a vowel, or vowels correlate with/converge to/diverge into in JLN.

A second factor is allophonic/phonetic level production, highlighted by the use of both correct vowel quality by some students, and un-natural but nonetheless communicable vowel quality by other students. The later shall be termed *wrong winners*. The presence of *wrong winners* may be caused by AE interference.

An AE-specific allophonic/phonetic level difficulty is that of vowel neutralization. According to Akamatsu (1997), Japanese speakers articulate vowels the same whatever environment they are in. In comparison, English speakers use the neutral vowel [ə] (typically appearing in unaccented syllables) in some lexical items, but not in others (Akamatsu 1997, Aoki 1990). Akamatsu raises the examples atomic [ə'tɔmɪk] and atom [ætəm]. JLN demands that vowel quality be the same wherever the vowel may be found. For example, if the words "atomic" and "atom" were to be rendered as JLN items, the shared vowels of the two items would be pronounced non-neutrally (*atomikku* and *atomu*) in all phonetic contexts. Akamatsu notes English-speaking students of Japanese have a tendency to neutralise vowels, such as in the words "ichi" [itʃi > ətʃi], "ochi" [otʃi > ətʃi] and "uchi" [ɯtʃi > ətʃi]. Since the vowels /i, o, u/ are distinct in Japanese, possible

lack of clarity of vowel sound can negatively effect communication.

A factor caused attributable to universal IL that may influence vowel quality production is the minimization of vowels. Aoki (1990:227) notes that in studies of students' memorization of nonsense words, the items with less vowel variety were easier for subjects to remember. In a similar way, [wa-ke-ni-wa] (the reason for) became [wakiniwa] (nonsense word) in some learners utterances.

In this way, JLN vowel quality can be influenced by learner acquisition of naturalisation rules at the phonemic and allophonic levels, as well as by AE neutralization and universal IL minimization.

2.5.3.2 Vowel duration

Kawarazaki (1979), Akamatsu (1997) and Toda (1994) all note incorrect vowel length effects communicability, and is a significant source of vowel errors - reconfirmed through examination of ANU Japanese learner written compositions. The effect of vowel quantity on communicability is demonstrated through the following minimal pairs: [biɾɯ] 'building' and [bi:ɾɯ] 'beer', [ʧizɯ] 'map' and [ʧi:zɯ] 'cheese', [jɯso:] 'transport' and [jɯ:so:] 'post', [kʰado] 'corner' and [kʰa:do] 'card'. Akamatsu (1997:262-4) gives the following example: [kʰoto] (traditional string instrument), [kʰo:to] 'coat', [kʰoto:] 'deserted island' and [kʰo:to:] 'oral response'.

Vowel quantity competency requires learners' familiarity with phoneme naturalisation rules. In cases excluding strong naturalisation (including vowel shortening), vowel length is similar to the lending language (AE) - short vowels are not lengthened, and vice versa. The present study will examine if quantity control difficulties are as prevalent in JLN as in NJ/SJ learner productions reported by Toda (1994), Akamatsu (1997) in an oral manner to ensure the curbing of potential interference by incomplete learner mastery of the *katakana* syllabary.

The present study will therefore focus on testing the environments VN vowel phoneme/allophone quality and quantity is required in JLN, in terms of correctness and incorrectness (foreign-like communicable and incommunicable response) of AE speaker production.

2.5.3.4 Consonant Naturalisation

For the purposes of the present study, we will consider CN to be comprised of consonant quality, as well as moraic unit production competency.

2.5.3.4.1 Consonant quality

Several levels of acquisition on the part of the learner effect consonant quality. On a phonemic level, JLN has a different phonemic inventory to SJ/NJ, as well as that of AE (as noted in section 2.4.4). As with VN, this implies rules for transfer (naturalisation rules) from phonemes of AE to phonemes of JLN, the transferal of which can take place in diverging (e.g. AE/t/ > J/t/, J/ts/), converging (AE/ð/ AE/z/ > J/z/) or corresponding (e.g. AE/ʤ/ > J/ʤ/) relationships.

In the case of corresponding phonemes, no change is needed on a phonemic level. Akamatsu (1997) notes little difficulty in the AE>JLN correlating phonemes of /b/, /p/, /k/, /g/, /h/, /ʧ/, /ʃ/, /ts/[22], /s/, /z/, /ʤ/, which have increased in number since the 1950s.

Conversely, in diverging and converging phonemic relations, there are always similar phonemes, and differing phonemes. In the case of AE/ð/ AE/z/ > J/z/, /z/ exists in both languages, but the AE phoneme /ð/ is outside the range or free variation for J/z/, and is unknown to the language - we will refer to this as an *unknown partner*. *Unknown partners* require learners' awareness of explicit consonant phoneme naturalisation rules, and should thus be more difficult to naturalise than correlating phonemes.

On an allophonic/phonetic level, consonant quality can also differ from AE to JLN. In cases where phonetic quality of phonemes differs from AE to JLN, for example in the phoneme /h/ (AE/h/ [h] _i > J/h/ [ç] _i), learners may successfully identify the corresponding phoneme, but produce it with AE allophonic/phonetic quality - we will refer to this as a *wrong winner*.

Allophonic/phonetic level CN production is made significantly simpler for learners through the use of the recent moraic unit inventories. We highlighted the expanded JLN consonant inventory in comparison with SJ and NJ in section 2.4.4, in comparison with most pronunciation researchers NJ and SJ-centered approach. Whereas SJ/NJ /t/ is realized as [t] before a, e, o, it is realized as [ʧ] before i, and [ts] before u, it is realized as [t] before all vowels in the present JLN model. In archaic models of JLN, /d/, for example, is realized as [d] before a, e, o, with realizations of either [ʤ] before i as in *kurejitto* (credit) or [de] as in *dezuniirando* (Disneyland), and [zu] before u as in *hinzuu-kyou* (Hinduism), whereas /d/ is realized as [d] before all vowels. In this way current JLN learners have much less idiosyncratic realizations to memorize, although the realizations do have some difference between AE and JLN varieties.

[22] Akamatsu (1997:258) notes word-initial and some medial difficulties exist [ts] > *[s], due to it not being found in word-initial location in English.

2.5.3.4.2 Consonant moraic unit production

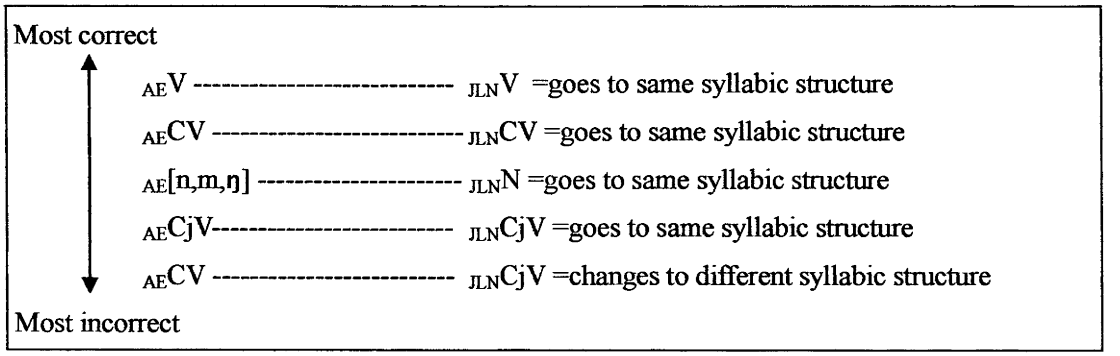
Unit production requires competency in (i) CN and VN phonemic naturalisation rules (both consonant and vowel quality effect correctness), (ii) allophonic/phonetic realizations (which effects nativeness/foreignness of utterance), and (iii) moraic structure rules.

CV and V structures are found in both AE and JLN, as well as being present in universal interlanguage. Only consonant/vowel phonemic naturalisation rule and allophonic/phonetic realization acquisition is expected to effect these structures.

N structures are found only in JLN. We may expect some OS hypercorrection to be present in learner production. Both Toda (1994) and Akamatsu (1997) also note N quantity difficulties in student pronunciation, although N quantity is outside the parameters of the present study.

CjV structures, while being present in AE words such as [pjuə] 'pure', [bju:ti] 'beauty', [fju:z] 'fuse', are limited. Akamatsu (1997:260) notes where native speakers pronounce [bjo] as in *byooin*, many learners pronounce [bijo]. The most difficult to produce consonant + semi-vowel appears to be [r'] (*ryokan* [rjokañ] is mispronounced [rijokañ] in many cases (Aoki 1990:228). We expect this form of AE interference in the structure of CjV items in the present studies survey.

A further expected difficulty in CjV structures was discovered through examination of student written composition and spoken production. As noted in (27) below, almost all naturalisation involves no shift of moraic structure type, with an exception to this rule being CV > CjV changes. CV > CjV changes occur only with the narrow input of AE [(k/g)], and appear difficult for many students to acquire.



(27) Ranking of expected difficulty of moraic unit production

The present study will therefore focus on testing the environments CN consonant phoneme/allophone quality, and moraic structure/unit production is required in JLN, in terms of correctness and incorrectness (foreign-like communicable and incommunicable response) of AE speaker production.

2.6 Summary

We have examined the sound systems of AE and JLN through OS, GF, VN and CN in this chapter. Chapter 3: Methodology will detail the survey structure used to measure subjects' (ANU students') acquisition of JLN, and highlight areas of difficulty and success in production.

VOWELS

Ref. →	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯	⑰	⑱	⑲	⑳	21
ア/a/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
イ/i/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ウ/u/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
エ/e/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
オ/o/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-

CONSONANTS

STOPS

(p)パ/pa/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ピ/pi/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
プ/pu/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ペ/pe/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ポ/po/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
(b)バ/ba/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ビ/bi/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ブ/bu/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ベ/be/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ボ/bo/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
(t)タ/ta/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
チ・ティ/ti/	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO	OO
ツ・トゥ/tu/	OO	OX	OO	OX	OO	OO	OO	OX	OX	OX	OO	OO	OX	OX	OO	OO	OX	OO	OO	OX	OO
テ/te/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ト/to/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
(d)ダ/da/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ヂ・ディ/di/	XO	XX	XO	XO	XO	XO	ジO	XO	XO	XO	OO	XO	OO	XO	XO	ジO	XO	XO	OO	OO	OO
ヅ・ドゥ/du/	XO	XX	XO	OO	OO	XO	ズO	XX	XX	XX	OO	XO	OX	XX	XO	ズO	XX	XO	XO	OX	OO
デ/de/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ド/do/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
(k)カ/ka/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
キ/ki/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ク/ku/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ケ/ke/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
コ/ko/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
(g) ガ/ga/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ギ/gi/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
グ/gu/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ゲ/ge/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ゴ/go/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-

AFFRICATES

(ts) ツァ/tsa/	O	X	O	X	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	X	O
ツィ/tsi/	X	X	O	X	X	O	X	X	X	X	X	X	X	X	X	O	X	O	O	X	O
ツ/tsu/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	X	O
ツェ/tse/	O	X	O	X	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	X	O
ツォ/tso/	O	X	O	X	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	X	O
(ch)チャ/cha/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
チュ/chu/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
チェ/che/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	X	O
チョ/cho/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
(JI) ジャ/a/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ジ/i/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ジュ/u/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ジェ/e/	O	X	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	X	O
ジョ/o/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-

FRICATIVES

(f) ファ/fa/	O	X	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
フィ/fi/	O	X	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
フ/fu/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
フェ/fe/	O	X	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
フォ/fo/	O	X	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
(v) ヴァ/va/	X	X	X	X	X	O	O	O	O	O	X	O	O	O	O	O	O	O	O	X	-
ヴィ/vi/	X	X	X	X	X	O	O	O	O	O	X	O	O	O	O	O	O	O	O	X	-
ヴ/vu/	X	X	X	X	X	O	O	O	O	O	X	O	O	O	O	O	O	O	O	X	-
ヴェ/ve/	X	X	X	X	X	O	O	O	O	O	X	O	O	O	O	O	O	O	O	X	-
ヴォ/vo/	X	X	X	X	X	O	O	O	O	O	X	O	O	O	O	O	O	O	O	X	-
サ/sa/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
シ・スィ/si/	OX	OX	OX	OX	OX	OO	OX	OX	OX	OX	OX	OX	OX	OX	OX	OX	OX	OX	OX	OX	OO
ス/su/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
セ/se/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ソ/so/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
(z) ザ/za/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ジ・ズィ/zi/	OX	OX	OX	OX	OX	OO	OX	OX	OX	OX	OX	OX	OX	OX	OX	OX	OX	OX	OX	OX	OO
ズ/zu/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ゼ/ze/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ゾ/zo/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
(ʃ) /ʃa/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
/ʃi/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
/ʃu/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
/ʃe/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	X	O
/ʃo/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
(h) ハ/ha/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ヒ/hi/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
フ/hu/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ヘ/he/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ホ/ho/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-

NASALS

(m) マ/ma/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ミ/mi/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ム/mu/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
メ/me/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
モ/mo/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
(n) ナ/na/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ニ/ni/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ヌ/nu/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ネ/ne/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ノ/no/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ン/N/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-

FLAPS

(r) ラ/ra/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
リ/ri/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ル/ru/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
レ/re/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ロ/ro/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-

SEMI-VOWELS

(j) ヤ/ja/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
イ/ji/	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-
ユ/ju/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
イェ/je/	X	X	X	X	X	O	X	X	X	X	X	O	X	X	O	O	O	O	O	X	O
ヨ/jo/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
(w) ワ/wa/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ウィ/wi/	X	X	O	X	X	O	O	O	O	X	X	O	O	O	O	O	O	O	O	O	O
ウ/wu/	X	X	O	X	X	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
ウェ/we/	X	X	O	X	X	O	O	O	O	X	X	O	O	O	O	O	O	O	O	O	O
ウォ/wo/	X	X	O	X	X	O	O	O	O	X	X	O	O	O	O	O	O	O	O	X	O

CONSONANT + SEMI-VOWELS (CjV)

STOPS

JLP MORAE	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯	⑰	⑱	⑲	⑳	21
(py) ピャ/pya/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ピュ/pyu/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ピェ/pye/	X	X	X	X	X	X	X	X	X	X	X	X	O	X	X	X	X	X	X	X	-
ピョ/pyo/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
(bj) ビャ/bja/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ビュ/byu/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ビェ/bye/	X	X	X	X	X	X	X	X	X	X	X	X	O	X	X	X	X	X	X	X	-
ビョ/byo/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
(ty) テャ/tya/	X	X	X	X	X	O	O	X	X	X	X	X	X	X	X	X	X	X	X	X	-
テュ/tyu/	X	X	X	X	X	O	O	X	X	X	X	X	X	X	O	O	X	O	O	X	O
テョ/tyo/	X	X	X	X	X	O	O	X	X	X	X	X	X	X	X	X	X	X	X	X	-
(dja) ヂャ/dja/	X	X	X	X	X	X	X	X	X	X	X	X	O	X	X	X	X	X	X	X	-
ヂュ/dju/	X	X	X	X	X	X	X	X	X	X	X	X	O	X	X	X	X	X	X	X	-
ヂェ/dje/	X	X	X	X	X	X	X	X	X	X	X	X	O	X	X	X	X	X	X	X	-
ヂョ/djo/	X	X	X	X	X	X	X	X	X	X	X	X	O	X	X	X	X	X	X	X	-
(dja) デャ/dja/	X	X	X	X	X	O	O	X	X	X	X	X	X	X	X	X	X	X	X	X	-
デュ/dju/	X	X	O	X	X	O	O	O	O	O	O	O	O	O	O	O	O	O	O	X	O
デョ/djo/	X	X	X	X	X	O	O	X	X	X	X	X	X	X	X	X	X	X	X	X	-
(kj) キャ/kja/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
キュ/kju/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
キェ/kje/	X	X	X	X	X	X	X	X	X	X	X	X	O	X	X	X	X	X	X	X	-
キョ/kjo/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
(gj) ギャ/gja/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ギュ/gju/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ギェ/gje/	X	X	X	X	X	X	X	X	X	X	X	X	O	X	X	X	X	X	X	X	-
ギョ/gjo/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-

AFFRICATES

(ʃj) フャ/ʃja/	X	X	X	X	X	O	O	X	X	X	X	X	X	X	X	X	X	X	X	X	-
フュ/ʃju/	X	X	X	X	X	O	O	X	X	X	O	O	X	X	O	O	X	O	X	X	O
フョ/ʃjo/	X	X	X	X	X	O	O	X	X	X	X	X	X	X	X	X	X	X	X	X	-
(vj) ヴャ/vja/	X	X	X	X	X	O	O	X	X	X	X	X	X	X	X	X	X	X	X	X	-
ヴュ/vju/	X	X	X	X	X	O	O	X	X	X	X	X	X	X	O	O	X	O	O	X	-
ヴョ/vjo/	X	X	X	X	X	O	O	X	X	X	X	X	X	X	X	X	X	X	X	X	-
ヒャ/hja/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ヒュ/hju/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ヒェ/hje/	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	O
ヒョ/hjo/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-

NASALS

(mj) ミャ/mja/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ミュ/mju/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ミョ/mjo/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
(nj) ニャ/nja/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ニュ/nju/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
ニェ/nje/	X	X	X	X	X	X	X	X	X	X	X	X	O	X	X	O	X	X	O	X	O
ニョ/njo/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-

FLAPS

(rj) リャ/rja/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
リュ/rju/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
リョ/rjo/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-

CONSONANT + SEMI-VOWELS (CwV)

JLP MORAE	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯	⑰	⑱	⑲	⑳	21
(kw)クァ/kwa/	X	X	X	X	X	O	O	O	O	O	O	O	O	O	O	O	O	O	X	X	-
クィ/kwi/	X	X	X	X	X	O	X	X	X	O	X	X	O	X	O	O	X	O	X	X	-
クェ/kwe/	X	X	X	X	X	O	X	X	X	O	X	X	O	X	O	O	X	O	X	X	-
クォ/kwo/	X	X	X	X	X	O	X	X	X	O	X	X	O	X	O	O	O	O	X	X	-
(gw)グァ/gwa/	X	X	X	X	X	O	X	O	X	O	X	O	O	O	O	O	O	O	X	X	-
グィ/gwi/	X	X	X	X	X	O	X	X	X	X	X	X	O	X	X	X	X	X	X	X	-
グェ/gwe/	X	X	X	X	X	O	X	X	X	X	X	X	O	X	X	O	X	X	X	X	-
グォ/gwo/	X	X	X	X	X	O	X	X	X	X	X	X	O	X	X	X	X	X	X	X	-

GERMINATE FORMATION, VOWEL LENGTHENING

ッ /Q/	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-
- [:]	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-

①Vance (1987), ②Japan Foundation (1991), ③Lovins (1973), ④Katayama (1998), ⑤Akamatsu (1997), ⑥Takebe (1980), ⑦Maeda (1971), ⑧Tomita (1988), ⑨Japan Foundation (1997), ⑩Takebe (1979), ⑪Kenkyusha (1979), ⑫Umeda (1989), ⑬Kawaharazaki (1989), ⑭Kato (1989), ⑮Japanese Language Council (1991), ⑯Nomoto (1990), ⑰Mitamura (1985), ⑱Aruku (1994), ⑲Inagaki (1986), ⑳Alfonso (1981), (21) Matsuzaki (1993) *A survey of 15 dictionaries to ascertain shift of inventory

Chapter 3
Methodology

3.0 Introduction

The aim of this chapter is to delineate the methodology of the present study's cross-sectional quantitative survey. In 3.1, I will describe the theories and previous research that influenced the present study. In 3.2 I will outline selection criteria for the subjects who served for this survey. In 3.3, I will then present the procedure for the survey. This will include some notes on the four levels of JLN, i.e. Open Syllabication, Germinate Formation, Vowel Naturalisation and Consonant Naturalisation, which are the levels targeted by the survey's item selection. Section 3.4 will provide a summary of transcription for the survey. Section 3.5 is devoted to discussion of the assessment criteria to analyze subjects' responses, which are based on the above-mentioned four levels of JLN naturalisation. A brief example will be given for each assessment criterion.

3.1 Second Language Acquisition theory and related studies

Several influential Second Language Acquisition (SLA) theories were considered in the construction of the methodology for the present study. These included CA (see Chapter 2: 1 - to account for L1 influence on TL JLN); Universal interlanguage studies (to account for universal influence on TL JLN); Variability Theory (to account for individual variety in the acquisition of TL JLN). An introduction to each theory, and actual previous research that influenced the present study is given below.

3.1.1 Markedness

Markedness studies that attempt to account for an order of difficulty of acquisition also exist. Eckman is quoted in Major (1994) "...markedness can predict order of acquisition: The less marked phenomenon is acquired before the more marked".

The present study intuitively (based on evidence from first hand SLA, summarizing of Japanese teacher diaries, Japanese teaching experience and error analysis of student essays and discourse) questions whether a pattern suggesting a ranking of ease of mastery exists. This ranking would start at Tarone's proposed acquisition constraint of epithesis (and corresponding with Nomoto's syllabication) to the learned areas of segmental levels (vowels/consonant naturalisation, assimilation, long vowels and finally progress to supra-segmental levels.

In a longitudinal error analysis study on children's acquisition of L1 morphemes, Brown and Cazden (1974) conducted a survey in which subjects' spoken production of 8 morphemes was elicited. The production of these 8 phonemes was assessed by (i) counting a subject's total responses in "obligatory instances" (where a morpheme would appear in native speech) for any of these 8 phonemes to be correct if the score was 90% or greater, and (ii) on the basis of the combined 90%+ scores from all subjects, to rank "acquired" morphemes. This lead to a claim that sequences of acquisition of morphemes exist. Brown and Cazden's method of firstly comparing the percentages of correct target item responses, and next, on the basis of these scores, attempting to identify a progression of acquisition of these target items, influenced the methodology of the present study.

While a claim by a number of researchers to a sequence or hierarchy of acquisition exists, SLA is by no means completely "universal" – Riney quotes Mulford and Hecht's (1981) proposal, based on Child SLA, that transfer operates more for vowels, and that developmental processes operate more for consonants. However, he notes, this is not to say the same applied for adult SLA. That is to say variants such as age (including the implication of L1 and L2 acquisitional processes at work) influence such sequence/hierarchies, and should be accounted for.

The present study will examine whether certain stages of the JLN process are more quickly acquired than others in a survey in which age and other non-linguistic variables are

controlled.

3.1.2 Interlanguage

Riney (1988) notes Selinker (1972) as defining interlanguage as the intermediate but rule-governed system between a subject's native language and the target language. This includes aspects not present in either AE or JLN. Tarone (1988) notes a number of natural constraints which effect SLA: (i) inherent difficulty, (ii) tendency toward a CV pattern, (iii) tendency to avoid extremes in pitch variation, (iv) tendency of articulators to come to a rest position and (v) emotional and social constraints. Segmental constraints noted by Tarone are taken into account in the assessment of the present study.

Nemser (1971) produced an influential work on SLA of Hungarian English speakers, which focused on specific English segmentals (inter-dental fricatives and stops) through both perception and production tests featuring the target segmentals in a number of phonological environments. The study recognised some productions for target items that were not influenced by either the native or target languages, as well as overgeneralization/hypercorrection for target language items not present in the native language.

A CA was conducted to anticipate possible native language interference by the subjects, after which a battery of pilot tests was conducted to ascertain the target structures subjects had difficulty with. Nemser's survey was next sub-divided into several test types: (a) discrimination, (b) identification, (c) production, and (d) repetition.

Yamada's (1994) work on Australian advanced Japanese language students tested for level of TL accent placement acquisition notes supra-segmental strategies exist which are similar between foreign and native other-dialect speakers when attempting to acquire *Hyojungo* supra-segmental proficiency.

Yamada's research is contrasted by Choi's (1983), who surveyed a group of 50 Chinese national Japanese speakers in a study of accent placement. Choi notes that 50 subjects were directed to produce 2, 3, 4 syllable words and compound word items. He next provides a model of patterns he infers all the subjects produced. Choi asserted Chinese speakers have typical supra-segmental production errors that are due mainly to L1

interference. While this kind of generalization of SLA in Chinese students of Japanese is useful in compartmentalizing tendencies, it does not account for the variety of production

Yamada's work highlights the importance of allowing for measurement of survey production to include universal interlanguage interference, and reflects the importance of Nemser's categorization of responses into more possibilities than only first language interference.

The present study includes interlanguage tendencies denoted by Major in the prediction of interference/production difficulties. It also includes quantitative evaluation possibilities for correct, AE interference, Japanese hypercorrection, interlanguage interference and absence in target item Japanese production, and in qualitative analysis of those quantitative results.

3.1.3 Non-linguistic Variability of Performance

The production of learners is also influenced by factors other than the mother language. A number of researchers note age, length of residence, linguistic aptitude, etc can influence performance.

3.1.3.1 Age

In regard to age, Riney (1988:21) notes "Most studies suggest the age of puberty is a critical turning point important for second language or dialect acquisition, and especially with regard to acquisition of a second phonology. Generally subjects who arrive before the age of puberty are found to speak the TL with a native speaker accent, and those who arrive after that period are not." Major (1994:182) adds "A volume of 12 papers treating different aspects of L2 acquisition (Krashen, Scarella and Long, 1982)[23] presented documentation that older learners progress faster at first but early exposure in natural settings ultimately produces higher proficiency in all areas".

An additional feature of age is the so-called "generation gap". While lexicon is the most obvious linguistic difference between generations, present JLN models used by younger

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[23] Krashen, Scarella and Long (1982): "*Child-adult Differences in Second Language Acquisition.* Rowley, MA; Newbury House.

generations display a significant expansion of inventory to those of the past. It is not the purpose of this work to examine what affects this difference, however the recognition of this difference is vital. Age is thus a crucial factor in both the potential for complete acquisition, and in ascertaining the model of JLN used by the learner.

3.1.3.2 Length of Residence

Riney (1988), who suggests length of residence in the target language is an important social variable in SLA examines this in a study focused on the American English acquisition by people of Vietnamese background in the US (i.e. non-native speakers living in the target language country). Riney suggests some interplay between *length of residence* and *age*. The present study concurs with Riney, and tested students with approximately the same 1-year life experience living in Japan.

3.1.3.3 Linguistic Aptitude

While aptitude is a variable that influences linguistic competency, the current study chose to focus on *level of Japanese study* itself as a mark of competency. The grouping of subjects in the current study represents differing levels of students at the ANU. Each of the subjects in any group having achieved passes or higher in the courses completed, thus indicating that all subjects in any one group have achieved a bare minimum competency (or higher) in the same level of study. However, since the current survey itself is designed as a measure of competency in the production of JLN, testing of competency could not be JLN-specific. Instead, we used the ANU's course placement system as a gauge of potential subject general Japanese competency.

3.1.3.4 Non-linguistic Variability of Performance studies

Riney (1988:34) notes acquisition is variable and related to linguistic and extra-linguistic constraints. As such, variation found in Interlanguage phonology demands the use of quantitative methodologies in order to survey tendency patterns of grouped production of varying, changing learner's models of language. The present study examined a number of both qualitative and quantitative works that took non-linguistic variability into account

including Min (1989), Choi (1994), Chung (1989), Pittam and Ingram (1990) and Riney (1988).

3.1.3.4.1 Single group studies

One typical way in which such a study can be conducted is to limit the work to a single group of learners. From here, generalizations can be made toward tendencies applicable to learners on the whole. Two examples of single group studies are those of Chung (1994) and Min (1989).

Chung (1994) did a quantitative grapho-phonological survey of 39 Korean Japanese learners' JLN competency. Subjects were tested in two ways: (i) 16 English items were written on a blackboard and subjects made to transcribe the items as loanwords both in Korean and Japanese, and (ii) 20 Korean loanword items were read out, subjects were made to write the items out as LJ items in *katakana*.

Each target item in Chung's study featured a structure to be tested. The targets were a) items including consonants, b) items including long vowels, c) items including germinates, and d) items possessing both conservative and innovative versions. Production by every member of the group was then allotted a score and then pooled on the basis of judging criterion: (i) correct, (ii) incorrect and (iii) compound incorrect responses. Following this percentage, Min provides an important qualitative description of errors.

While Chung's work was a useful study, the validity of the researcher's contribution to interlanguage loanword phonology in showing the non-standardized nature of IL loanword phonology may be impeded by several factors. Firstly, reading English items found as LJ in Korean pronunciation for Korean students to transcribe into Japanese may be questionable. Secondly, test items selected can also be found in Tamamura's (1991) "Kihon *Gairaigo* 170go" work on frequently used *gairaigo* lexical items, going against Nemser's suggestion of using nonsense and low lexicality items in the conduction of effective pronunciation testing. Thirdly, the testing method presumes mastery of *Katakana* for subjects, and fourthly the test assumes loanword phonology can be effectively analyzed in a grapho-phonological way despite non-native learner's pronunciation and orthographic production being different in cases. Both Chung's useful methodology and the points of caution above were taken into

account with the construction of the present study's methodology.

Min's (1989) work on SLA supra-segmental production took a qualitative perspective. A limited group of Korean speakers of Japanese were compared with Japanese native speakers for their supra-segmental competency in reading short passages. Min measured supra-segmental production in terms of morae for the passage, and next categorized for correct and incorrect high/low pitch, lowering of pitch and overly-shortened moraic unit length. Min next provided a rationale for the occurrence of this differing supra-segmental performance, and next undertook an assessment of Korean speaker's supra-segmental production by Japanese speakers. These final two stages are outside the scope of the present study. Min's use of multiple values in assessing target structures, as well as his comparative approach in assessing production influenced the present study.

Single group studies, as their name suggests, focus on the production of a single group of subjects as representative of the greater whole. Although taking aspects of Min and Chung's studies into account, the present study attempts to survey the production of several differing subject groups representing differing learner levels. Several multiple group studies are discussed below.

3.1.3.4.2 Multiple group studies

Multiple group studies divide the focus of research into multiple groups/cells of subjects, determined in many cases by non-linguistic independent variables. Pittam and Ingram (1990) and Riney (1988) both undertook studies of the English competency of Vietnamese speakers, selecting factors such as age and length/intensity of language contact as independent variables.

Pittam and Ingram's (1990) work was a longitudinal study of Vietnamese English speakers in Australia. Members of a recently arrived Vietnamese family (4 subjects) were identified for age and intensity of language contact, and surveyed for production of two areas of production predicted to be difficult for Vietnamese ESL speakers: (i) long-short vowel distinction, and (ii) diphthongs before a final consonant.

Items were elicited by showing pictures to the subjects (all of which contained the target structures (i) and (ii) above), and next asking them to tell the researchers what they

were in English. The researchers provided the TL pronunciation for the subjects if they didn't know the item. Finally, 9 items were selected and annotated via computer for phonetic processes and features made, with a CA analysis and item production errors broken down into number of errors made. Additionally an aural perception test was conducted which falls outside the present study's focus.

Riney (1988) published a study of the IL phonology of Vietnamese speakers of English, which provided much useful direction for the present project. Firstly, the study's 40 subjects were classed according to the independent variables of (i) age of arrival in target language environment, (ii) length of residence, and other linguistic variables. Secondly, syllables in which the target feature could be found (e.g. consonant clusters, epithesis, voicing, final release) were selected from naturalistic speech of subjects. Next, items were placed in columns according to the phonetic environment occurred in. Riney notes that an approach to the assessment of parts of subjects' pronunciation of an item either being "present" or "absent" is not enough. Focus was placed on: (a) epithesis, (b) deletion, (c) voicing, (d) final release, (e) /s/, (f) "resonant + obstruent" clusters, (g) reducible "resonant + obstruent" clusters, and (h) irreducible "resonant + obstruent" clusters. The results of production for target structures were next assessed in terms of the independent variables.

Riney's work is representative of multiple group variation studies, and influenced the present study in a number of ways. The use of group independent variables was adapted by firstly controlling the age and length of exposure of subjects, and next by selecting levels of general proficiency as the independent variable. The application of multiple possible values for data collection from target structures was also adopted. Riney's comparison of production with English, Vietnamese and Interlanguage phonologies is also crucial in ensuring the present study attempts to account for as clear a model of as possible of differing levels of Australian learner's JLN production.

3.2Subjects: their socio-linguistic profile and the Independent Variable

3.2.1 Socio-linguistic profile of the subjects

The present study focuses on the acquisition of JLN by Australians. The community from which subjects were solicited was the student body enrolled in Japanese classes held by the Japan Centre, Faculty of Asian Studies, Australian National University (ANU). Selection criteria of the subjects were set as follows:

First language (as detailed in Chapter 2), which plays a large part in influencing second language acquisition. For the purposes of accounting for variation in first language, the most common English variety in modern Australian society, general AE, was selected (as noted in Chapter 2: 2.1) with subjects being native speakers of AE born and raised in Australia.

Age/period of birth, which plays a part in influencing JLN model selected. JLN inventories have expanded both in the past 50 and 20 years (Lovins' 1973 model of JLN is already archaic by some younger speakers more segmentally-flexible models of pronunciation). The present study therefore selected equal male/female (although there is no known difference in gender/sex specific performance) subjects in their 20s who have been exposed to more modern JLN models.

Another factor the present study took into consideration regarding age was possible Japanese acquisition before the Critical Period noted by Fromkin (1990) and Yavas (1994), who note Critical Period has been identified by Scovel (1988) as being post-puberty. Each of the subjects selected had their first contact with acquiring/learning Japanese post-puberty, ensuring the critical period hypothesis regarding differences in acquisition and learning was cancelled.

Gender was initially considered as one of the variables in the current survey, in order to observe all possible influences on the subjects. However, the results of the survey revealed that there are no significant tendencies observed between genders in language learning. Thus, gender will not be included for discussion of the results of the JLN survey delineated in Chapter 4.

Knowledge of gairaigo and katakana, which also plays an important part in JLN

production. To this end subjects that had completed the ANU's Japanese language placement tests and/or courses equivalent to having completed first year written/spoken Japanese, the level at which students are instructed in *katakana* and some JLN phenomena, were selected.

The above criteria of (i) first language, (ii) age/gender, (iii) knowledge of *katakana/gairaigo* were used as subject selection criteria to define the potential subject base, with the actual divisions of these criteria in each group as follows in (27) below:

	G1				G2				G3			
	L1	AGE	M/F	JLN	L1	AGE	M/F	JLN	L1	AGE	M/F	JLN
①	AE	20s	M	1+	AE	20s	M	2+	AE	20s	F	3+
②	AE	20s	F	1+	AE	20s	F	2+	AE	20s	F	3+
③	AE	20s	F	1+	AE	20s	M	2+	AE	20s	M	3+
④	AE	20s	M	1+	AE	20s	F	2+	AE	20s	M	3+
⑤	AE	20s	M	1+	AE	20s	F	2+	AE	20s	F	3+
⑥	AE	20s	F	1+	AE	20s	F	2+	AE	20s	F	3+
⑦	AE	20s	M	1+	AE	20s	F	2+	AE	20s	F	3+
⑧	AE	20s	M	1+	AE	20s	M	2+	AE	20s	M	3+
⑨	AE	20s	F	1+	AE	20s	M	2+	AE	20s	M	3+
⑩	AE	20s	M	1+	AE	20s	F	2+	AE	20s	M	3+

(27) Subject base makeup

3.2.2 Independent Variable

This study hypothesizes that Australian learners of Japanese will approach native-like correctness of production in proportion to their level of general Japanese competency. Towards this, *level of Japanese language study* was chosen as the Independent Variable in this survey. While length of study/residence may account to some extent for linguistic ability, studies by Pittam and Ingram (1990), as well as works by Major (1994) and Borland (1985) note that individual variation in terms of motivation, along other psychological factors, can sizably affect the extent of potential linguistic competency. Since this is the case, the present study decided to focus directly on subject's concrete level of Japanese study, as the present study required three subject groups of staggered proficiencies in Japanese. To this end, the present study selected individuals as subject group members based on their placement within

ANU Japanese courses (entrance to which is subject to a proficiency placement test: See Appendix 4: Placement Test[24]). All subjects needed to have received initial *gairaigo* and *katakana* instruction, so only potential subjects that had (i) completed first year spoken and written Japanese courses[25], or (ii) were accredited with a similar level of Japanese through the ANU's initial placement test, were selected. Three groups of subjects were selected as follows in (28) below:

Group	**Criteria**	Male	Female
Group 1	Completed 1st year written Japanese	5 persons	5 persons
Group 2	Completed 2nd year written Japanese	4 persons	6 persons
Group 3	Completed 3+ year Japanese	5 persons	5 persons

(28) Subject makeup by independent variable

[24] As A specific example of the Placement Test can be found in Appendix 4. The test itself is divided into Written and Spoken test sections. For placement in the intermediate course, students require a 60%+ score in sections 1 – 5 of the Written Test, and 50%+ in the Spoken Test. For placement in the advanced course, students needed a 50%+ score in section 6 of the Written test, and 80%+ in the Spoken test. However, some students were unable to clear the criteria for placement in intermediate written classes, despite being placed in second year spoken Japanese classes, and were thus placed in first year classes. Since the only explicit instruction in JLN takes place in first year written classes, all subjects needed to have passed first year written classes as a bare minimum requirement to selection in this study.

[25] First and second year courses are comprised of dedicated written and spoken Japanese courses; the first year written Japanese course contains the only explicit instruction of JLN naturalisation rules (*katakana*, lexical items and a very brief introduction to some JLN naturalisation phenomena) in not only the first or second year courses, but in any of the ANU's Japanese language courses offered. Loanwords are, however, found as lexical units within each of the courses taught.

3.3 Procedure

3.3.1 Survey item selection

The present survey was designed to test representative target items for the four levels of the present model of JLN. They are Open Syllabication, Germinate Formation, Vowel Naturalisation and Consonant Naturalisation. In order to achieve this, the following items were required: Open Syllabication consisted of four items with consonant clusters containing for each of the inserts *u*, *i* and *o* (totaling 12 items). Germinate Formation included four items in pen-ultimate and anti-penultimate positions containing the target (totaling 4 items). Consonant Naturalisation targeted the five natural classes of a) stops, b) affricates, c) nasals, d) fricatives and e) glides/liquids, and tested consonant quality, and consonant moraic structure/unit production (totaling 20 items). Vowel Naturalisation – specifically a) J/i/, b) J/e/, c) central vowels, d) J/a/, e) J/u/, f) J/o/ and the diphthongs g) rising diphthongs and h) centring diphthongs, targeted four items in each class, and tested vowel quality and quantity (totaling 32 items). Moraic Structure included 4 items each for a) N, b) V, c) CV, d) CjV and e) CV > CjV structures (totaling 20 items). Assessment criteria for the tests of each of these topics follow in Section 3.5.

In the case of correlating phonemes, the same phoneme was naturally used, but similar/dissimilar phonemes were both used in the case of converging phonemes. In order to ensure economy of testing, some items featured more than one target, with the total number of test items being 48. Actual test items are listed in Appendix 3: Survey Item List below.

With regard to actual item selection, research by Nemser (1971) suggests use of nonsense words may prevent high-level interference in second language phonology surveys – the present survey was thus influenced by including mostly nonsense and in some cases lowly lexicalised words as survey items.

3.3.2 Data collection

Data collection consisted of an aural survey designed to elicit responses representative of each subject's present model of JLN (OS, GF, VN and CN). Each survey was conducted on a one-to-one surveyor-to-subject basis at the Japan Centre, ANU, and took approximately 10

minutes for each subject, excluding a warm-up period.

In order to account for any possible variation in items to be elicited, an audio-tape of all survey items was replayed to informants to ensure identical input. The audio-tape provided the pronunciation input for the 48 Survey Item List in a randomly mixed order for informants, who were asked simply to 'pronounce the word as it would be said in Japanese'. The straightforward approach to capturing target items for analysis meant test-effect (that is, the subject's consciousness of the fact they are being surveyed or tested induces in that subject self-consciousness of language use, and possibly different production than what they would normally allow) needed to be minimized. As a result, leading questions such as 'how would you say this in *katakana*?' were avoided[26].

The actual survey was conducted according to the following steps. (i) the author entered into casual Japanese conversation with the subjects, asking them to talk on topics that naturally required JL production, then conducted a 'warm-up' by eliciting responses for a number of dummy test items before entering the test proper. (ii) each item was given in English. (iii) the subject considered form of JLN item, and responded with the expression "*sore wa*_____ *desu*" (*that is*___). (iv) the response was recorded, transcribed to Production List (see Chapter 4) in IPA, as delineated in Section 3.4. Following transcription, the subject's productions were assessed and assigned a value as noted in the Production Tally (see Chapter 4) according to the analysis criteria detailed in Section 3.5.

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[26] Observation of ANU student spoken utterances of LJ lexical items highlights frequent lack of Open Syllabication, misplaced Germinate Formation and different vowel/consonant quality, as well as vowel duration. However, when writing a loanword in *katakana*, the individual is forced to consider vowel naturalisation/duration, consonant naturalisation and open syllabication strategies, despite the fact that when under spoken conditions, speech sound quality not represented in *katakana*, as well as consonant combinations left unnaturalised by OS are possible. The phrase above was deliberately avoided to give subjects as little clues as possible as to potential strategies that might have assisted their production linked to the constraints demanded by *katakana*.

3.4 Transcription

Survey responses from the 10 subjects in each of the three groups (a total of 30 subjects) were transcribed in IPA to a Production List (See Chapter 4). The number in the top left-hand corner of this list indicates item number corresponding with the item number found in the present study's Survey Item List (Appendix 3). The uppermost transcription is the original general AE pronunciation (and that uttered by the author via a recorded cassette played in eliciting subject's production). The transcription below this is the JLN pronunciation based on the JLN model found in Chapter 2: AE/JLN Contrastive Analysis. The following ①, ②, ③,..⑩ are subject 1 – 10's production transcriptions. The author listened to items several times (replaying the production cassette tape) to obtain as detailed a phonetic transcript as possible, the detail of which was important in the accurate judgment of production criteria for the survey (see Section 3.5).

3.5 Response assessment

The raw IPA data described in Section 3.4 was next transferred to a Production Tally (see Appendix 6 for actual Tally) by designating the status of each target item according to assessment criteria for the first four stages of the present study's JLN model. Chapter 2's JLN model was implemented as the gauge of correctness of production for this survey in determining the form of the final loanword item, with the same chapter's AE model used in determining possible AE interference. Specific criteria are detailed divided by stage below.

3.5.1 Open Syllabication

Open Syllabication item targets were assessed as being "O"=correct, "J△"=Japanese hypercorrection, "?△"=other hypercorrection or "-"=not present. Correct items include the correct insert. Japanese hypercorrection includes incorrectly selected *u*, *i* and *o* inserts. Other hypercorrection includes all those inserts outside of the three *u*, *i* and *o* inserts. Finally not present includes all targets not filled by an insert. Examples of each of the assessment criteria are noted in (27) below for the example [brɪdʒ] 'bridge', in which the consonant cluster [br] is the target subject to OS.

○ [bɯridʒ]　　△J[boridʒi]　　△?[beridʒi]　　- [bridʒi]

(30) OS assessment examples

3.5.2 Germinate Formation

Germinate Formation targets were assessed as "O"=present, "-"=not present, in both pen-ultimate and anti-penultimate positions. Examples of both of the assessment criteria are noted below in (31), illustrated with the example [wæks] 'wax' in which the consonant k following the lax vowel [æ] is the target subject to GF.

○[wakkɯsɯ]　　- [wakɯsɯ]

(31) GF assessment examples

3.5.3 Vowel Naturalisation

Vowel Naturalisation examined (i) j/i/, (ii) j/e/, (iii) central monophthongs, (iv) j/a/, (v) j/u/, (vi) j/o/, (vii) rising diphthongs and (viii) centring diphthongs from the perspectives of (a) Vowel Quality and (b) Vowel Duration. Assessment criteria for (a) and (b) are delineated below.

3.5.3.1 Vowel quality

Vowel quality targets were assessed as "O"=correct phoneme/correct allophonic naturalisation; the selection of the correct phoneme in JLN along with production of the correct allophone in the target item. " △ "= correct phoneme/incorrect allophonic naturalisation (with the sub-divisions of E=AE and ?=other); each being the selection of the correct phoneme in JLN, but produced outside the range of free-variation for correct allophonic production (being either an incorrect English (AE) or other-influenced consonant quality within the range of communicability). "X"=incorrect/incomplete; being an incorrect phoneme selection or a partially incomplete diphthong, and "-"=absent; being the non-production of the target item. Examples of these assessment criteria are noted below in (32), illustrated with the example [dʌboU] 'Dubbo' in which [ʌ] is target, [əbaʊt] 'about' in which [ə] is target, and [ɒlɪviə] 'Olivia' in which [iə] is target.

○[dabo:]	△E[dʌbo:]	△?[dæbo:]	X[debo:]	-[dbo:]
○[abaɯto]	△E[əbaɯto]	△?[abaɯto]	X[ʌbaɯto]	-[baɯto]
○[oɾibia]	△E[oɾibiə]	△?[oɾibiæ]	X[oɾibieɾɯ/oɾiba]	-[oɾib]

(32) Vowel quality assessment examples

3.5.3.2 Vowel duration

Vowel duration targets were assessed as correct (no marking on the Production Tally), "+"=incorrectly long; "- -"=incorrectly short, or "X"=incomplete/absent; being the partial production or non-production of the target item. Examples of these assessment criteria are noted below in (33), illustrated with the example [mjænma:] 'Myanmar' in which [ma:] is target, [əls] (nonsense word) in which [l] is target and [dʒənoUləf] (nonsense word) in which

[oU] is target.

correct [mjamma:]	-- [mjamma]
correct [(s/ʃ)isɯ]	+ [(s/ʃ)isɯ:]
correct [ʤeno:raɸɸɯ]	X[ʤen(o/u)raɸɸɯ] X[ʤeneroraɸɸɯ/ʤenraɸɸɯ]

(33) Vowel duration assessment examples

3.5.4 Consonant Naturalisation

Consonant Naturalisation examined (i) + voice stops/affricates, (ii) - voice stops/affricates, (iii) fricatives, (iv) nasals, and (v) glides/liquids from the perspectives of (a) consonant quality, (b) consonant moraic units, and (c) moraic structure. Assessment criteria for (a) - (c) are delineated below.

3.5.4.1 Consonant quality

Consonant quality targets were assessed as being "O"=correct phoneme/correct allophonic naturalisation; the selection of the correct phoneme in JLN along with production of the correct allophone in the target item. " △ "= correct phoneme/incorrect allophonic naturalisation (with the sub-divisions of E=AE, J=Japanese, and ?=other(possible IL)); each being the selection of the correct phoneme in JLN, but produced outside the range of free-variation for correct allophonic production (Possessing incorrect Japanese (J), English (AE) or other-influenced consonant quality within the range of communicability). "X"=incorrect; being an incorrect phoneme selection, and "-"=absent; being the non-production of the target item. Examples of these assessment criteria are noted below in (34), illustrated with the example [rid] 'reed', in which [r] is the target subject to CN.

○[ri:do] △J[li:do] △E[ri:do] △?[ɾi:do] X[ni:do] -[i:do]

(34) Consonant quality assessment examples

3.5.4.2 Consonant moraic units

Consonant moraic unit targets were assessed as "O"=correct; the selection of correct moraic structure along with communicable consonant and vowel quality, or "X"=incorrect; the selection of incorrect moraic structure, consonant and/or vowel quality rendering the item non-communicable. Examples of these assessment criteria are noted below in (34), illustrated with the examples [dju:ti] 'duty' in which the production of the CjV form [(dj/ʤ)ɯ] inclusive of structure, consonant and vowel quality is target, and [ɵɜ:ti] 'thirty', in which the CV form [sa:] inclusive of structure, consonant and vowel quality is target.

○[(dj/ʤ)ɯ:ti:] X[diɯ:ti:/dijɯ:ti:] ○[sa:ti:] X[(ɵ/t)a:ti:] X[sɜ:ti:] X[sia:ti:]

(34) Consonant moraic unit assessment examples

3.5.4.3 Moraic structure

Moraic structure targets were assessed as "O"=correct; the selection of correct JLN moraic structure from AE input, or "X"=incorrect; the selection of incorrect JLN moraic structure from AE input. This structural analysis focused solely on moraic structure, rather than phonetic quality. Examples of both assessment criteria are noted below in (36), illustrated with the example [tÞn] 'ton' in which the word-final N structure is target, [pjuə] 'pure' in which the word-initial CjV structure is target, and [kæʃ] 'cash', in which the original CV becomes CjV structure, is target.

○[toñ] X[tonɯ] ○[pjɯa] X[piɯa] ○[kjaʃʃɯ] X[kaʃʃɯ]

(36) Moraic structure assessment examples

3.6 Conclusion

In Chapter 3, I have presented some information related to the methodology of the current study. With the survey subjects, survey items and test delivery defined, we have described the analysis criteria for the present study's four level analysis of student JLN production. Again, these four levels are Open Syllabication, Germinate Formation, Vowel Naturalisation and Consonant Naturalisation. These four are adopted to assess the subjects' responses, and are, important concepts for our discussion of the results and analysis of the survey presented in Chapter 4.

Appendix 3: Survey Item List

1. Open vowel syllabication (3 rules x 4 items =12)

(1) t,d insert:	01.[wÞʃt]	02.[mædl]	03.[strʌg]	04. [flɜ:d]
(2) ʧ, ʤ insert:	05.[blntʃt]	06.[mʌnʤ]	07.[mʌ:ʤ]	08. [ətrautʃ]
(3) all others insert:	09.[sluə]	10.[dɛlvz]	11. [dɛfrel]	12. [ji:ld]

2. Germinate insertion (1 rule x 4 ex = 4)

13.[bltmæp] 14.[tldÞks] 15.[zʌtʃ] 16.[græʃ]

3. Consonant naturalisation (5 classes x 4 items = 20)

(1) - voice stops:	14.[tldÞks]	17. [kʊmba:]	18. [pju:gi:]	30. [ʧɜ:n]
(2) + voice stops:	20. [gu:n]	21. [djurʌplɛks]	22. [zʌbɜ:b]	31. [ʤənoUləf]
(3) Nasals :	24. [nlftlk]	25. [llu:n]	26. [mjænma:]	27. [pllŋk]
(4)Fricatives :	28. [fu:tl]	29. [vlpə:]	19. [əls]	23. [tauð]
(5)Liquids/Glides :	12. [ji:ld]	32. [plɜ:t]	33. [wum]	34. [wÞmpʊt]

4. Vowel naturalisation (8 classes x 4 items= 32)

(1) i, I /i/:	(I) 14. [tldÞks]	19. [əls]	(i) 12. [ji:ld]	18. [pju:gi:]
(2) ɛ /e/:	(ɛ) 10. [dɛlvz]	11. [dɛfrel]	21. [djurʌplɛks]	44. [slɛʃ]
(3) ə, ɜ:	(ɜ) 04. [flɜ:d]	22. [zʌbɜ:b]	(ə) 8. [ətrautʃ]	31. [ʤənoUləf]
(4) æ, ʌ, a /a/:	(æ) 13. [bltmæp]	26. [mjænma:]	(ʌ) 22. [zʌbɜ:b]	(a) 7. [mʌ:ʤ]
(5) u, ʊ /ɯ/:	(u) 18. [pju:gi:]	21. [djurʌplɛks]	(ʊ) 34. [wÞmpʊt]	35. [tʊp]
(6)ɔ, Þ /o/:	(ɔ) 01. [wÞʃt]	14. [tldÞks]	(Þ) 46. [tɔləbral]	47. [plɔdrlə]

(7) Rising diphthongs: (eI) 11. [dɛfrel] (oʊ,oI) 31. [ʤənoUləf] 45. [hout] (aI, aʊ) 46. [tɔləbral]

(8) Centring diphthongs: (Iə) 47.[plɔdrlə] (ɛə) 38. [gəstɛə] 48. [mɛə] (ʊə) 09.[sluə]

5. Moraic Structure (5 structures x 4 items =20)

(1) N structures:	05. [blntʃt]	06. [mʌnʤ]	26. [mjænma:]	27. [pllŋk]
(2) V structures:	08. [ətrautʃ]	25. [llu:n]	36. [ɜ:ni]	37. [Þllviə]
(3) CV structures:	06. [mʌnʤ]	24. [nlftlk]	29. [vlpə:]	38. [gəstɛə]
(4) CjV structures:	18. [pju:gi:]	21. [djurʌplɛks]	26. [mjænma:]	39. [bju:t]
(5) CV>CjV struct.:	40. [kærəbi:nə]	41. [kælgu:li]	42. [gæfə]	43. [gæəə]

Spoken Test Placement test

SPOT

Simple Performance-Oriented Test

ばんごう_____なまえ_____

テープを聞いて( )にひらがな1字を書きなさい。
はじめに練習が10あります。テープで「練習」と日本語で聞こえたら、まず練習をしてみてください。

1. どうぞよろ( )く。

2. ここは静( )ですね。

3. おはよう( )ざいます。

4. わたし( )たなかです。

5. ごはんを食( )ました。

6. どこから( )ましたか。

7. あしたここに来ます( )。

8. ぜんぶ( )いくらですか。

9. タクシーでいきま( )ょう。

10. あたらし( )車を買いました。

では、テストです。セクション(A)をやります。テープで「では、はじめます」と日本語で聞こえたら、ページを開いてはじめてください。

A.

1. そこ(　　)何をしてるんですか。
2. あの人は日本では有名(　　)人ですよ。
3. 今度、映画見(　　)行かない？
4. その中(　　)なに入ってんの？
5. となりの人(　　)教えてもらったんです。
6. あのグリーン(　　)スカート、いいなあ。
7. 指導教官の先生(　　)はもう会いましたか。
8. 木村先生に会(　　)ればいいのですが。
9. 「ＴＩＳＡ」っていうの(　　)知っていますか。
10. あのコーヒー(　　)おいしい店、名前何だっけ？
11. あしたは、ちょっと大事(　　)用があって行けないんです。
12. ほら、あの窓(　　)ところにいるでしょう。
13. 郵便局のところ(　　)曲がってください。
14. あそこに地図がはって(　　)りますよ。
15. 好きな人(　　)もいるの？
16. 肉の色(　　)変わったら、火を止めてください。
17. 彼ったら、えらそう(　　)ことばかり言って。
18. きのうは一日中そうじ(　　)せられて、大変だった。
19. 約束してたの(　　)来なかった。
20. 旅行の申し込み書なんですけど、これ(　　)いいですか。
21. 毎日手紙を書く(　　)とにしよう。
22. 来週の会議については、あとで(　　)連絡します。
23. いま説明したのが、この茶色(　　)見えるところです。
24. それはそう(　　)と思います。
25. 何やり始める(　　)と思ったら、なあんだ。
26. 会議があったこと、すっかり忘れ(　　)た。
27. 留学生(　　)とって筑波は住みにくいところです。
28. きょうはもうそのぐらい(　　)して、早く帰ろう。
29. 新聞を読んでも、本当のことはなかなかわからない(　　)けです。
30. 部屋代は東京(　　)ど高くないです。
31. これからはもっとがんばら(　　)きゃ。
32. 出かけ(　　)うとしたら、電話がかかってきた。
33. 君の(　　)いで遅れちゃったよ。
34. アルバイトっ(　　)いえば、このあいだの話、もう決まった？

36. 必ずしもよくなるとは(　　)ぎらない。

37. うちの母も、もう６０(　　)し。

38. これはうちの問題(　　)ありまして、そちらには関係のないことです。

39. いまの(　　)までだいじょうぶでしょう。

40. あの人、結婚しない(　　)じゃないの？

41. ゴミの問題はひどくなって(　　)く一方だ。

42. はやく行っ(　　)って、なんかもらえるわけじゃないし。

43. 今度のアパート、場所(　　)いいんだけどね。

44. そりゃ、外国人(　　)あなたにはいいかもしれないけど。

45. 今後それをどのように証明できる(　　)が、最大のポイントとなります。

46. 私たちも何かす(　　)きだ。

47. うん、思った(　　)りずっと進んでるな。

48. 就職した(　　)らといって、勉強が終わったというわけじゃないよ。

49. それだけでは終わりそう(　　)ないですね。

50. 私に言えない(　　)うなことでもあるの？

51. 早く国へ帰りたいなあなん(　　)思ったりします。

52. すみませんが、ちょっと手伝っていただ(　　)ませんか。

53. 作ってはみた(　　)のの、あまりいいプログラムじゃなかった。

54. 私のこと聞いたんでしょう、彼(　　)。

55. あいつ、酒飲んで寝ちゃっ(　　)さ。

56. この調子なら、おれ、どんどん読(　　)ちゃいそう。

57. いやだけど、どうしてもやら(　　)るをえないんだ。

58. 人口が増えるに(　　)たがって、住みにくくなってきた。

59. だから、私はそういう(　　)うに思いました。

60. A：あのう、田中さんという方は？
　　B：ええと、あそこに立っている人(　　)田中さんです。

61. A：先週山に行ったんですよ。
　　B：だれ(　　)いっしょに出かけたんですか。

62. A：家事やりますか。
　　B：せんたく(　　)かはしますけど、そうじはしませんね。

63. A：そのけが、どうしたの？
　　B：自転車に乗って(　　)、ころんじゃった。

64. A：毎日ひまでひまで。
　　B：じゃ、あしたどこ(　　)行かない？

65. A：ねえ、この話知ってる？
　　B：うん、きのうの新聞(　　)出てたよ。

FACULTY OF ASICAN STUDIES
JAPAN CENTRE

Placement Test - 1996

WRITTEN JAPANESE

一時間四十分

名前：_____

Question Sheet

1. Rewrite the underlined part _____ by using Kanji, and write the reading for the underlined Kanji in Hiragana. Use the answer sheet. [30x2=60]

(e.g.) あした、日本へいきます。

(1) どよう日、わたしは新聞をよんでいました。

(2) おんなの人はぎんこうのうしろにいます。

(3) りんごをやっつ買いました。

(4) 田中さんは今朝何時におきましたか。

(5) ようこさんは、今月のようかにキャンベラへ来ます。

(6) 英語ではなしてください。

(7) わたしはまいにち、五時間ぐらいテレビを見ます。

(8) やすみの間、シドニーへ行きました。

(9) きのう、安いくつを買いました。

(10) きのうしろいくつを二足買いました。

(11) 時間はしっていますが、場所はしりません。

(12) みずを飲みます。

(13) かいしゃは五時におわります。

(14) きょうはいそがしいですね。

(15) 高校の時のともだちがたくさん来ました。

(16) 耳がいたいです。

(17) おおきくてりっぱな家です。

(18) 山下さんは、フランス語が上手です。

(19) つぎのえきで、でんしゃをおりてください。

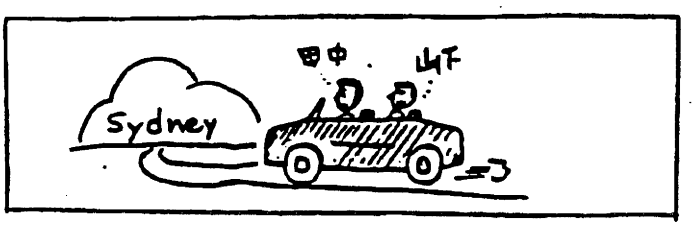
(20) きのう、キャンベラは大雨でした。

(21) 木よう日に田中さんのあたらしい家でパーティーをしました。

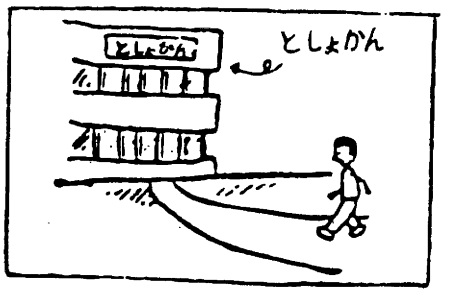
2. Make up sentences which describe the picture(s) using the key words below. Each question should be answered in **one sentence** no matter how many pictures are given. Use all the given words. You may need to change the verb form (e.g. 行く–> 行って)

[5x4=20]

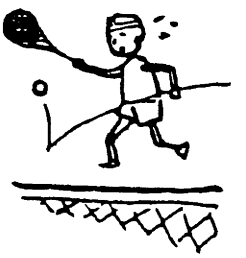
(e.g.) 日曜日、
山下さん、
行く



(1) いつも、田中さん
火曜日、
としょかん



(2) ～から、～まで
大学、きのう

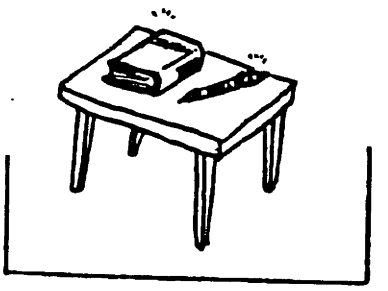


tennis

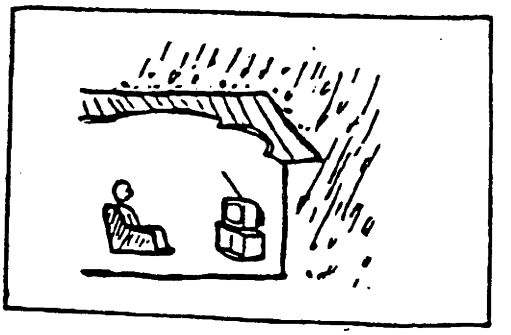
3.00pm～4.30pm

(3) 買いませんでした、
～ので(because)

(4) ペン、本
日本語、
テーブル



(5) 一日中、きのう
雨、テレビ、家



3. Rewrite the underlined part __ by using Kanji, and write the reading for the underlinesd Kanji in Hiragana. Use the answer sheet. [30x2=60]

(e.g.) わたしは学生です。

(1) 郵便局はどこにありますか。

(2) あした三時に駅前の喫茶店で会いましょう。

(3) 外国へ行きます。

(4) もう一度確かめてください。

(5) それは間違いでした。

(6) あの太い木のとなりでしゃしんをとりました。

(7) 両親は今シドニーです。

(8) 車の調子はどうですか。

(9) 休みの間日本へ行くよていです。

(10) きのうは頭痛で会社を休みました。

(11) このコーヒーはぜんぜんあつくありません。

(12) 今いくらのこっていますか。

(13) 弟は今入院しています。

(14) 田中さんにつたえてください。

(15) 私はフランス語がむずかしいと思います。

(16) 田中さんから地図とてがみをもらいました。

(17) 田中さんは今日は赤いシャツをきています。

(18) 喫茶店の中には若い人がたくさんいました。

(19) 魚が好きですか。

(20) きのう、ぎんこうに行きましたが。

(21) 友達の誕生日に人形をあげるつもりです。

(22) 人がおおいですね。

(23) あのながい鉛筆(えんぴつ)は私のです。

(24) ここなら、あんぜんです。

(25) かじの被害は数千万円だそうです。

(26) これでたのしい漢字のテストが終わりました。

4. Read the following sentences and choose the appropriate word for the underlined part. If there is more than one answer, make sure to write them all. Answer the questions by choosing the letter(s), and write them the **answer sheet.**

[15x2=30]

(例)　これは＿＿＿＿おいしくありません。 (a) あまり　(b)　よく　(c)　ぜんぜん　(d)　たいへん

(1) ここには＿＿＿来ますか。

(a) あまり　(b) よく　(c) まいにち　(d) たいへん

(2) 朝ご飯を＿＿＿食べました。

(a) たくさん　(b) とても　(c) なかなか　(d) たいへん

(3) 私は、ここには＿＿＿来ません。

(a) あまり　(b) よく　(c) 一度　(d) たまにしか

(4) 私は、ここには_____来たことがあります。

(a) 一度も (b) 一度 (c) あした (d) まだ

(5) 私はあした_____行きません。

(a) どこかへ (b) どこへも (c) どこでも (d) どこかへも

(6) 今東京に_____人の数は一千万以上です。

(a) 住んだ (b) 住んでいる (c) 住むな (d) 住んでの

(7) いつも家の_____で買い物をします。

(a) 近い (b) 近く (c) 近所 (d) 近ごろ

(8) 私のかばんは重さが田中さんのかばんの二倍_____。

(a) あります (b) します (c) ごろです (d) しています

(9) 田中さんは来週日本へ行く_____です。

(a) のは (b) そう (c) ところ (d) はず

(10) 私は、これは_____食べたくありません。

(a) よく (b) 二度と (c) 二度 (d) もう

(11) となりの部屋には_____ありません。

(a) 何も (b) 何でも (c) 何か (d) 誰も

(12) 田中さん、ヒーターを_____ください。

(a) ついて (b) つけて (c) あいて (d) あけて

(13) あした、朝ご飯が_____後、シビックへ行きます。

(a) 終わる (b) 終わって (c) 終わってた (d) 終わっている

(14) 山下さんに電話をかけたいのですが、_____を知っていますか。

(a) 番号 (b) 番 (c) 電話番 (d) 数

(15) 先生に質問(しつもん)を_____いいですか。

(a) 聞いても　(b) くれて　(c) わかっても　(d) しても

5. Make up **a sentence** using the Key word(s) given. You may use a variational form of the given verbs, adjectives, e.g. past, negative form, etc. and the answers should end with a polite expressiosn, i.e. -masu or -desu form. [5x4=20]

（例）　私、　行く

(1) ～より、　ずっと

(2) ～まま、　～ので

(3) ゆうべ、　～すぎる、　おなか

(4) ～時、　～なければならない

(5) 私のしゅみは

6. 次の文章を読んで、後の問１～問５の質問に答えなさい。 (単語表は次ページ。

私たちがここにマイホームを買って、６年になる。今は、都心まで電車で一時間半ぐらいで行ける。

６年前には、家も少なく、桜の多い静かな所だった。交通は、とても不便で、駅まではバスで２０分ほどかかったし、小さな駅だったので、急行は止まらないし、都心にある勤め先までは３回も乗り換えなければならなかった。

買い物も近くに小さなスーパーがあっただけで不便だった（ 1 ）、都心には家は買えない（ 2 ）、子供たちのためにはいい環境が欠かせないと思った。（ 3 ）、あえてここを選んだ。

ここは空気がいいから、晴れた日には富士山が見えるし、庭が広いので日当たりもよく、プライバシーも持てる。和室の六畳が二つ、洋室の四畳半が一つ、八畳の応接間、それにダイニングキッチンと、それほど大きな家ではないが、マイホームに住めることがとてもうれしかった。ただし、家のローンを払うのがちょっと大変だったが・・・。

でも、あんなに不便だったのに、６年の間につぎつぎと大きな団地が建てられ、私たちのように都心に家を買えない若い家族がたくさん引っ越してきた。家から歩いて５、６分の所に駅もでき、不便だった電車も都心から乗り換えもなしで、家まで帰れるようにもなった。

今では、家から歩いて行ける所に小学校から高校までできたし、都心にあった大学も、広くて環境のよい所がいいといって、去年、家の近くの駅や隣の駅の近くに引っ越してきた。

隣の駅前には、大きなデパートも駐車場もできた。きれいな公園やコンサートホール、そして子供のためのサイエンス・センターなどもでき、便利でにぎやかになった。家から隣の駅までの道も広くなり、５、６分もあれば車でこの便利なミニ都心に買い物にも行ける。６年前にはこんなに発展するとは思ってもみなかった。桜並木も大きくきれいになったし、富士山もまだ見える。物価も高くなったとは思わない。子供もたのしく学校に行っているし、大学だって、家の近くに通えることになるかもしれない。

こんなに便利になったので、まだまだ、この近くの人口は増え続けるだろう。あのときローンが大変だと思ったが、ここに引っ越してきてよかった。家を買っておいて本当によかったと思う。

7. ＿＿線の動詞の主語を（　　）に書きなさい。

1　田中さんに車で送ってあげると言われたが、たくさんお酒を飲んでいるようだったから、ていねいにことわって、歩いて帰ることにした。

ていねいに politely.　ことわる to turn down an offer

1) 送る　（　　）
2) 言う　（　　）
3) 言われた　（　　）
4) 飲む　（　　）
5) ことわる　（　　）
6) 歩いて帰る　（　　）

2　仕事で遅く帰ってきた娘に早く結婚しろと言ったら、仕事が面白いから結婚はまだしたくないと言われてしまった。

1) 帰る　（　　）
2) 結婚する　（　　）
3) 言った　（　　）
4) 言う　（　　）

Chapter 4
Results and Analysis

4.0 Introduction

This chapter is an analysis of G1, G2 and G3 production of the first four stages of JLN to determine comparative production performance by group[27]. The first four sections are ordered identically to Nomoto's (1990) JLN model: Open Syllabication in 4.1, Germinate Formation in 4.2, Vowel Naturalisation (comprised of vowel quality and quantity) in 4.3, Consonant Naturalisation (comprised of consonant quality and moraic unit survey) in 4.4, and in 4.5, an additional survey into comprehensive moraic structure.

The findings of this chapter show that production differed between G1, G2 and G3 in each of the four stages of JLN covered by the present study, with much of the JLN production reaching a high level with G3 subjects. However, characteristic mistakes in production exist which are present in the responses from all groups for OS, GF, VN and CN, and highlight both the strengths and weaknesses present in Australian Japanese learner JLN production.

[27] Gender was initially considered as one of the variables in the current survey, in order to observe all possible influences on the subjects. However, the results of the survey revealed that there are no significant tendencies observed between genders in language learning. Thus, gender will not be included for discussion of the results of the JLN survey in this chapter.

4.1 Open Syllabication

Open Syllabication (OS) is the first of the JLN stages to be examined. The focus is on the three vowel inserts of *i*, *u* and *o* in consonant clusters and following word/morpheme-final consonants.

4.1.1 Predictions for Open Syllabication

Little coverage of OS production is to be found in L2 Japanese pronunciation literature. Previous JLN studies (Min 1989, Chung 1989) focused on *katakana* orthography-based responses from subjects, characters presupposing OS structure.

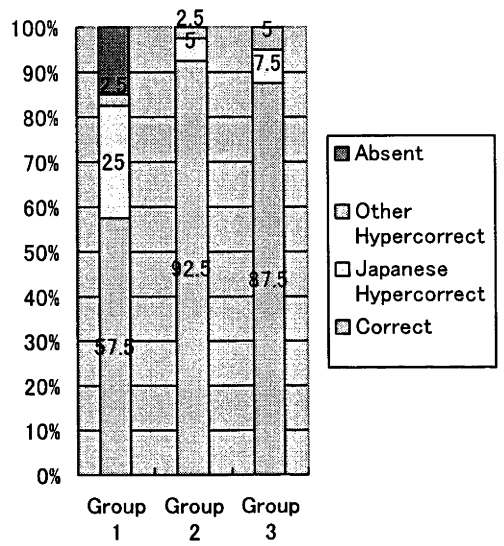
As was detailed in Chapter 2, Japanese (including JLN) and AE possess different syllabic structure. Whereas AE has closed-syllable words, Japanese is an open-syllable language, and treats the introduction of closed-syllable words with OS. Thus OS is a JLN naturalisation process that plays an important role in the adoption of loanwords in Japanese.

Of the inserts, *i* is only applicable following [tʃ]/[dʒ], and *o* after [t]/[d]. The insert *u* is found in all other positions, and as such has the highest range of occurring environments by default. Further, OS does not occur in English. Given this, we would expect to see (i) a lack of OS due to L1 (AE) interference, as well as (ii) the *u* insert, being found in the widest variety of environments, being the most quickly acquired insert.

4.1.2 Open Syllabication focus/tables and figures

12 items (4 items for each strategy) were selected and included both morph-final and mid-consonant cluster targets.

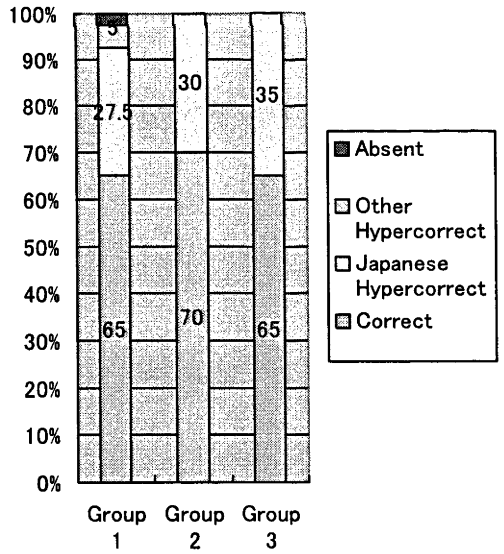
(37) – (39) show the responses by Group 1, Group 2 and Group 3 (with 10 subjects per group) presented by insert type in percentile form, as calculated from Appendix 5: Production Lists to Appendix 6: Production Tallies. (37) shows production results for insert *o*, (38) for *i* and (39) for *u*. Tables (40) and (41) indicate the sum total of production tallied from those results highlighted in Tables (37) – (39). All results for these tables are divided into correct production, hypercorrection and absence.



(37) OS: "o" insert percentile results

4.1.2(1) O inserts: items 01.[wɒʃt], 02.[mædl], 03.[strʌg], 04.[flɜ:d]

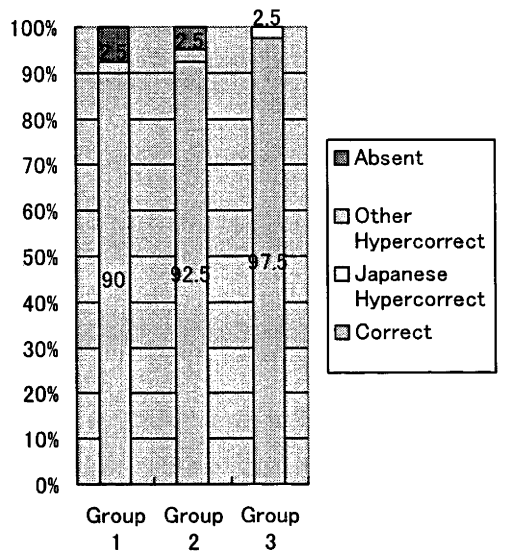
G2 and G3 displayed similarly high production, with G1 performing at a significantly lower level. The majority of hyper-corrected responses were *u* inserts. One vowel reduction item each by G1 and G3 was also included, and two G2 and one G3 showed the insertion of *a*. G1 production included insert absence.



(38) OS: "i" insert percentile results

4.1.2(2) I inserts: items 05.[bɪntʃt], 06.[mʌndʒ], 07.[mʌ:dʒ], 08.[ətrautʃ]

G1, G2 and G3 all demonstrated low performance in correct *i* insert responses, and a large section of hyper-correction, all of which were *u* inserts, except for one vowel reduction ə item each by G1 and G2. One case of absence was seen in G1 responses.

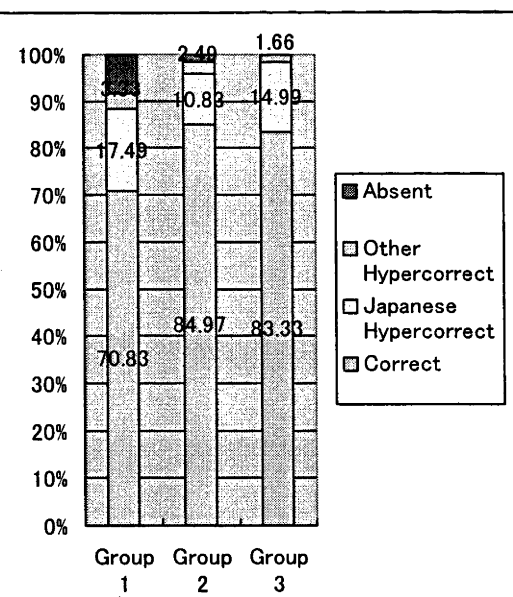


(39) OS: "u" insert percentile results

4.1.2(3) U inserts: items 09.[sluə], 10.[dɛlvz], 11. [dɛfrel], 12.[ji:ld]

G1, G2 and G3 all demonstrated native-like performance with regard to the *u* insertion. One vowel reduction item each by G1 and G2 was observed, as well as one hypercorrection *o* insert by G3. G1 and G2 production included a number of absences of inserts.

4.1.3 Open syllabication results



(40) OS: total percentile results

Total insert production

Group 2 and Group 3 showed similar levels of correct production, and hypercorrection. G2 also included a small amount of insert absence. G1 displayed lower correct, more hypercorrection, and the largest section of absent insert responses.

Absent	Japanese hypercorrection	Other hypercorrection	Correct
(1)G1=6 G2=0 G3=0 (2)G1=1 G2=0 G3=0 (3)G1=3 G2=2 G3=0	G1=10 G2=1 G3=3 G1=11 G2=12 G3=14 G1=0 G2=0 G3=1	G1=1 G2=2 G3=2 G1=2 G2=0 G3=0 G1=1 G2=1 G3=0	G1=23 G2=37 G3=35 G1=26 G2=28 G3=26 G1=36 G2=37 G3=39
G1=10 (8.33%) G2=2 (1.66%) G3=0 (0%)	G1=21 (17.49%) G2=13 (10.83%) G3=18 (14.99%)	G1=4 (3.33%) G2=3 (2.49%) G3=2 (1.66%)	G1=85 (70.83%) G2=102 (84.97%) G3=100 (83.33%)

(41) OS: total scores

Absence of any insert was found in G1 responses at 8.33% of total production, demonstrating a lower awareness of OS in Japanese. G2 demonstrated a substantially lower amount of insert absence at 1.66% of total production, with G3 showing no insert absence.

Japanese hypercorrection formed a proportion of production (G1=17.49%, G2=10.83% and G3=14.99%), while conversely, other hypercorrection made up only a small part of the total production (G1=3.33%, G2=2.49% and G3=1.66%). The Japanese hypercorrection *u* insert made up the largest sector of the sum total of hypercorrection at G1=23/25 (92%), G2=13/16 (81.25%), G3=17/19 (89.47%). This suggests *u* may be used as a default OS strategy, and is supported by the significantly higher production of *u* inserts in comparison to the less successful *i* and *o* respectively, and the low number of insert attempts with vowels other than *u o, i*, such as *a, ə*.

The results of 4.1.2 (1) - (3) suggest that *u* inserts are most often applied in correct environments (although this success is partially due to hypercorrection by G1, G2 and G3), followed by *o*, then *i* at a somewhat lower successful level.

In summation, G1 OS production appears to include the lowest correct insert production, as well as the greatest share of absence of insert and hypercorrection (mostly *u*). At G2 and G3, most absence disappears, with high level correct production of *u*, *o* and *i* inserts in that order of correctness, and some hypercorrection (mostly *u*). This suggests if absence of insert is present, hypercorrection will be more prevalent than if absence of insert is not present.

4.2 Germinate Formation

Germinate Formation (GF) is the second of the JLN stages examined. The focus of analysis is on the final (ultimate) or second-to-final (penultimate) consonants following lax vowels detailed in Chapter 2: 4.2.

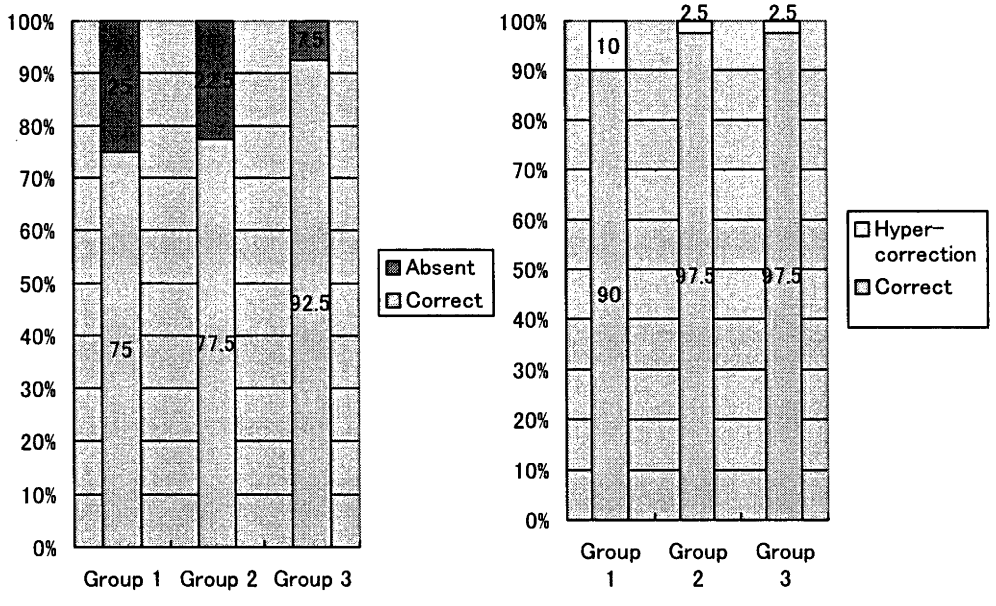
4.2.1 Predictions for Germinate Formation

As noted in Chapter 2: 2.4, GF is a JLN phenomena not found in AE/USAE. While AE phonology includes assimilation of adjacent consonants, GF occurs in different environments; namely, between a consonant and its preceding stressed lax vowel. Since GF occurs in completely different locations to AE assimilation, it must be learnt. The present study predicts GF will be progressively more correctly produced (present) from G1 to G3.

4.2.2 Germinate Formation focus/tables and figures:

items 13.[bɪtmæp], 14.[tɪdÞks], 15.[zʌtʃ], 16.[græʃ] / Hypercorrection: 04. [flɜ:d], 08.[ətrautʃ], 24.[nɪftɪk], 38.[gəstɛə]

Four items were selected which included final and penultimate consonant targets following lax vowels (items 13, 14, 15 and 16), and four other target items in which GF would not be



(41) GF: total percentile results (Left: standard GF, Right: hyper-correction assessment)

undertook in native speech (items 04, 08, 24 and 38). The table to left in (41) shows total number of G1, G2 and G3 correct (present) and absent production targets, and the table to right total number of G1, G2 and G3 correct (absent) and hyper-correct (subject to GF) production targets in percentile form, as calculated from Appendix 5: Production Lists to Appendix 6: Production Tallies.

4.2.3 Germinate formation results

Environments Requiring GF	Results by Group	Environments Not Requiring GF	Results by Group
Absent	G1=10, G2=11, G3=3	Absent (Correct)	G1=36, G2=39, G3=39
Present (Correct)	G1=30, G2=29, G3=37	Hyper-correction	G1=4, G2=1, G3=1

(43) GF total scores

GF is acquired at a high level at G3 level: G3 performed at near native level at 92.5% (37/40 correct responses), and G1 and G2 performed at a lower level. This suggests G1 and G2 show a reasonable awareness of GF, but that GF is acquired at a high level at G3. The high level of correct production by G3 subjects in comparison with G1 and G2 highlights an increasing approach towards native-like production (see (42) above), despite GF being a process unique to JLN not found in AE. This data supports the prediction that GF correct production will increasingly approach native-like levels in learner production.

However, an examination of those environments not requiring GF (see (43) above) shows that, while only to a small extent, that all groups possessed some hyper-correction, indicating that while learners are capable of GF to a reasonable degree in G1 and G2, and a higher level at G3, that some vagueness of understanding of GF rules in JLN remains at all three stages.

4.2.4 Germinate formation discussion

While Germinate Formation and assimilation are both referred to as 'sokuon' in Japanese, Germinate Formation, discussed in 2.4.2 and 4.2, is a process distinct from assimilation as found in AE. GF occurs in completely different environments to assimilation, and thus must be learnt by learners. Suzuki (1984) notes that ordinary English native speakers have a tendency to dispense with /Q/ when pronouncing Japanese loanwords. This tendency for absence of GF was observed among the Group 1 and 2 (lower and intermediate learners) subjects at a sizeable 22.5 – 25% level. Higher level of correct production was observed among Group 3 (advanced learners) at 92.5% correct and only 7.5% absence. This suggests G1 and G2 level earners have a reasonable awareness of GF, but may still be constrained by the AE tendency to delete /Q/ at their levels. Mastery of GF appears to emerge from around G3 level, despite the students necessity to go against English's tendency to dispense with /Q/. This result supports the hypothesis JLN (GF) competency will rise in proportion with learners' overall Japanese competency.

4.3 Vowel Naturalisation

4.3.1 Vowel quality

4.3.1.1 Predictions for Vowel Quality

As noted in Chapter 2: 4.3, AE has 12 vowels (as well as 3 archaic vowels), compared to modern Japanese' 5 vowels. While the majority of these vowels are front/back vowels closely similar to each other, central vowels (as noted in Chapter 2: 4.3.1) are found only in AE, not JLN. Additionally, the central vowel [ə] appears in place of other AE vowels in unaccented syllables. These vowels without identical counterparts are subsumed as branches of converging phonemes - with such alien members of AE to JLN converging naturalisation processes referred to as *unknown partners* by the present study.

Previous studies of student spoken Japanese suggested first language (AE) interference in the vowel quality of some students. Vowels influenced by AE vowel quality may still be communicable, but 'foreign' to native speakers. We refer to these items as *wrong winners*.

The present study then predicts: (i) relative ease in corresponding (i.e. non-central vowels and related rising diphthongs); (ii) difficulty in members of converging phonemes – referred to here as *unknown partners* - not found in JLN (i.e. central vowels and centring diphthongs); and that (iii) JLN vowel production interference by AE substitution – referred to here as *wrong winners* – gradually decreases toward native-like production in subjects.

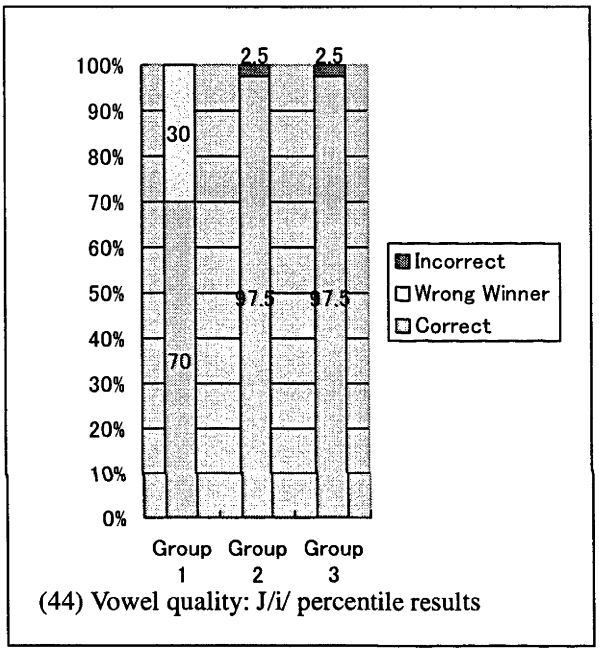
4.3.1.2 Vowel quality focus/tables and figures

32 items (4 items for each of the 8 vowel groups) were selected. The selected items included word-initial, medial and final vowel targets.

Two analyses were conducted for vowel quality: the first, a tense/lax vowel analysis to determine whether tense/lax affects vowel quality, and the second, a JLN vowel analysis to determine a ranking of difficulty JLN vowel, including foreignness analysis.

The following tables show G1, G2 and G3 responses in percentile form ((44) - (52)) and in score form (53), as calculated from Appendix 5: Production Lists to Appendix 6:

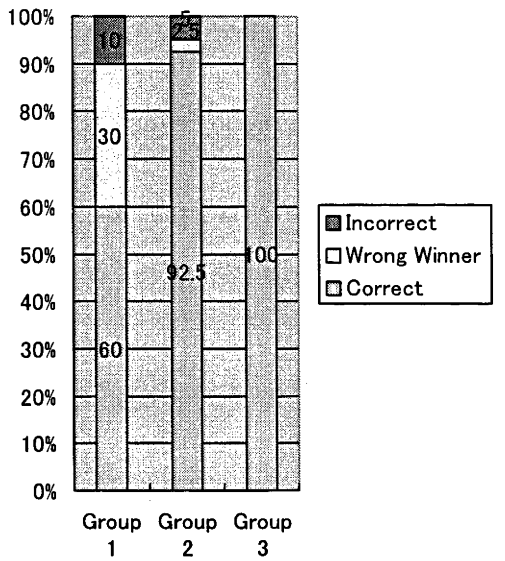
Production Tallies; (44) – (52) denote JLN vowel quality production in terms of (correct & *wrong winner* allophone); (53) denotes total production by all groups, with (54) showing vowel production difficulty ranking, with correct, wrong winner, total communicable results, and incorrect results given for G1, G2 and G3, with the total scores for each vowel group ranked in order of difficulty.



(44) Vowel quality: J/i/ percentile results

4.3.1.2.1 J/i/: items 12. [ji:ld], 14. [tldÞks], 18. [pju:gi:], 19. [əls]

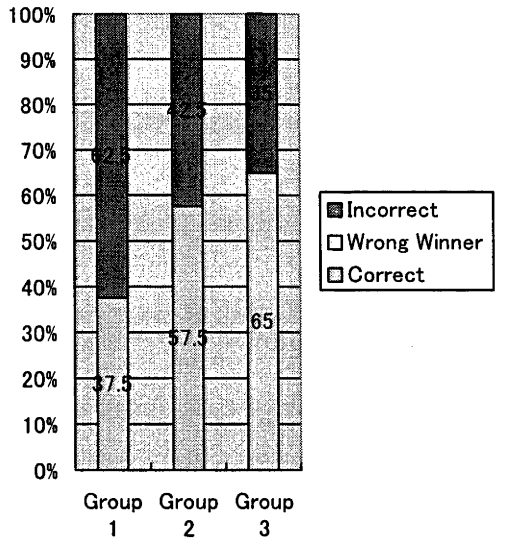
G2 and G3 displayed native-like production. G1 displayed high communicative level of production inclusive of *wrong winner* quality production: this *wrong winner* production was divided into nasalized long J/i/ and AE interference ([I]) in short J/i/ production. G2 and G3's one error each are attributable to AE vowel reduction (J/i/ > AE/ə/), a process highlighted as one English speakers use in pronouncing Japanese loanwords by Akamatsu (1997) and Suzuki (1984:65).



(45) Vowel quality: J/e/ percentile results

4.3.1.2.2 J/e/: items 10. [dɛlvz], 11. [dɛfrel], 21. [djurʌplɛks], 44. [slɛʃ]

In this item, G2 and G3 again displayed native-like production. G1 showed a high communicative level of production including a significant share of communicable AE interference: G2 production included 2, and G1 included 3 incorrect productions accountable to AE defray/di-fray. G1's remaining incorrect production was a case of whole syllable deletion[28], in survey item 21 (one of the survey's longest and most complex items). G2's remaining incorrect responses were attributable to AE vowel reduction.



(46) Vowel quality: central vowel percentile results

4.3.1.2.3 Central vowels: items 04. [flɜ:d], 08. [ətrautʃ], 22. [zʌbɜ:b], 31. [dʒənoUləf]

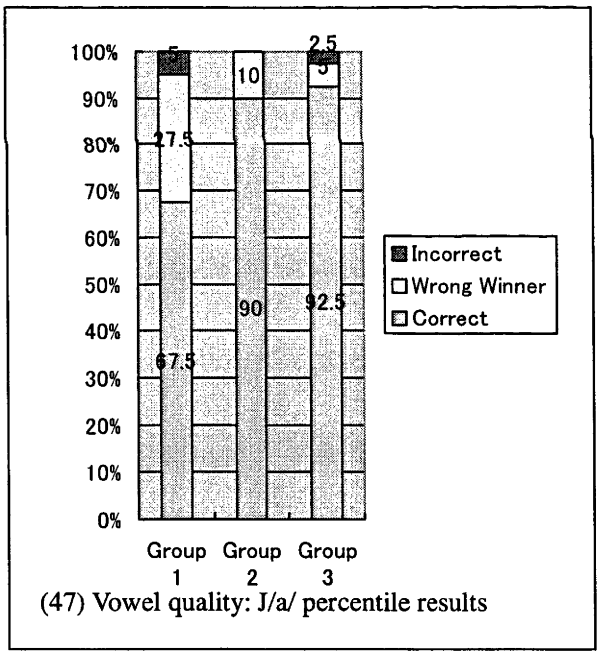
G1, G2 and G3 displayed graduating poor to reasonable success in producing correct vowel quality. Since no corresponding central Japanese vowels exist, [ɜ] and [ə] must converge (*unknown partners*) and appear difficult to relate implicitly with JLN sounds. Two strategies were apparently at work

[28] Weinberger (1994, p.287) notes "..all language learners.. when confronted with syllable structures that are far too complex for their phonetic ability, will modify those structures to make them conform with their present level of phonetic ability". Weinberger further notes that deletion and epenthesis are possible modifications in such a case.

in incorrect responses: (i) use of AE vowel quality (of which [ɜ] comprised the majority of items: at [ə] G1=2/11, G2=1/9 and G3=0/3. [ɜ] G1=9/11, G2=8/9 and G3=3/3.), and (ii) use of other incorrect vowel quality.

Subjects experienced relative ease in word-final vowels, which, as Mannell and Cox (1999) note, only permit long monophthongs, diphthongs and schwa. All groups produced perfectly correct production in this location in items 29, 40, 42 and 43.

This ease is contrasted by the difficulties of *vowel reduction*. Since, as noted by Mannell and Cox, unstressed AE syllables revert to [ə] schwa vowel quality, speakers must rely on known morphemes in their lexicon to base vowel quality judgement on, in some cases involving selection of the most probable vowel from a number of possibilities. For pre-existing words such as item 40, a high degree of success in production was observed, whereas nonsense word items 08, 31 showed less success.



(47) Vowel quality: J/a/ percentile results

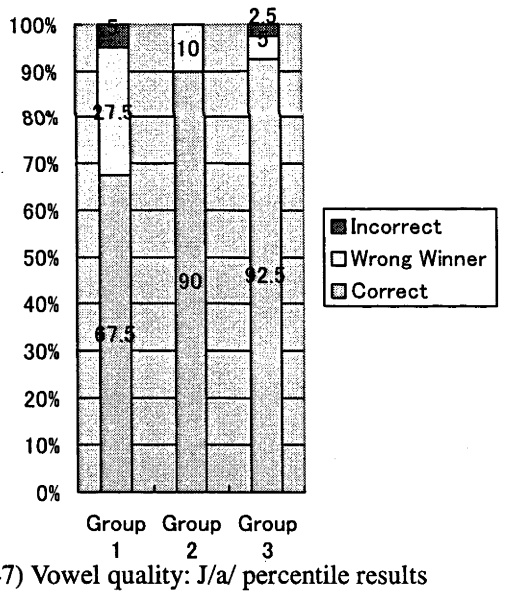
4.3.1.2.4 J/a/: items 07.[mʌ:dʒ], 13. [bɪtmæp], 22.[zʌbɜ:b], 26.[mjænma:]

G2 and G3 displayed high levels of production with a small amount of *wrong winners*, while G1 performed at a lower level (including a sizable portion of *wrong winners*, as well as a small number of incorrect productions). *Wrong winner* distribution was roughly equal for [æ] and [ʌ], with [a] being of the same quality as j/a/. Two G1 and one G3 responses were observed, accountable to AE vowel reduction.

in incorrect responses: (i) use of AE vowel quality (of which [ɜ] comprised the majority of items: at [ə] G1=2/11, G2=1/9 and G3=0/3. [ɜ] G1=9/11, G2=8/9 and G3=3/3.), and (ii) use of other incorrect vowel quality.

Subjects experienced relative ease in word-final vowels, which, as Mannell and Cox (1999) note, only permit long monophthongs, diphthongs and schwa. All groups produced perfectly correct production in this location in items 29, 40, 42 and 43.

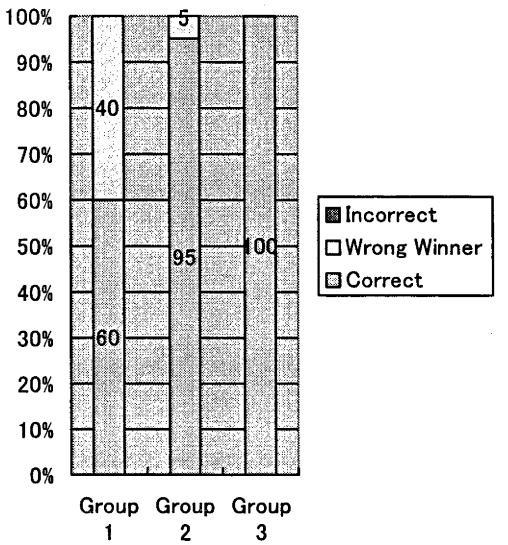
This ease is contrasted by the difficulties of *vowel reduction*. Since, as noted by Mannell and Cox, unstressed AE syllables revert to [ə] schwa vowel quality, speakers must rely on known morphemes in their lexicon to base vowel quality judgement on, in some cases involving selection of the most probable vowel from a number of possibilities. For pre-existing words such as item 40, a high degree of success in production was observed, whereas nonsense word items 08, 31 showed less success.



(47) Vowel quality: J/a/ percentile results

4.3.1.2.4 J/a/: items 07.[mʌ:dʒ], 13. [bltmæp], 22.[zʌbɜ:b], 26.[mjænma:]

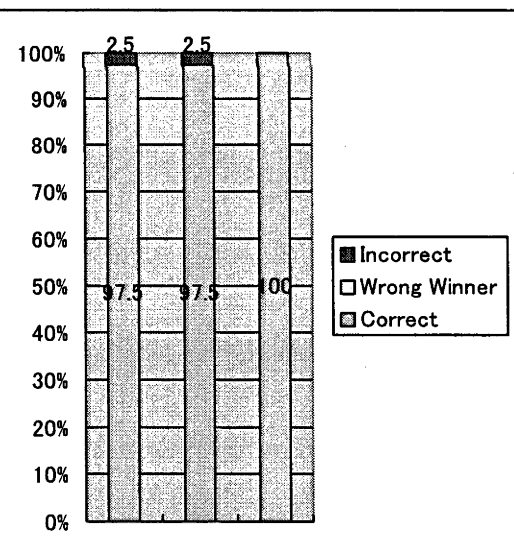
G2 and G3 displayed high levels of production with a small amount of *wrong winners*, while G1 performed at a lower level (including a sizable portion of *wrong winners*, as well as a small number of incorrect productions). *Wrong winner* distribution was roughly equal for [æ] and [ʌ], with [a] being of the same quality as j/a/. Two G1 and one G3 responses were observed, accountable to AE vowel reduction.



(48) Vowel quality: J/u/ percentile results

4.3.1.2.5 J/u/: items 18.[pju:gi:], **21.**[djurʌplɛks], **34.**[wÞmpʊt], **35.**[tʊp]

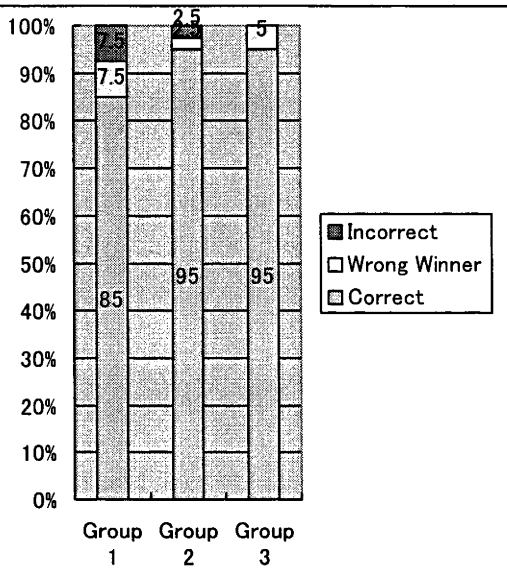
G2 and G3 displayed high levels of production with a small amount of *wrong winners* (AE interference) by G2. G1 performed at a lower level (including a sizable portion of AE interference *wrong winners*). Whole syllable deletion was observed following one G3 response.



(49) Vowel quality: J/o/ percentile results

4.3.1.2.6 J/o/: items 01.[wÞʃt], **14.** [tIdÞks], **46.**[tɔlәbraI],**47.**[plɔdrIә]

G1, G2 and G3 all displayed high level production. G1 and G2 both included only one incorrect production each, accountable through AE orthographic interference.

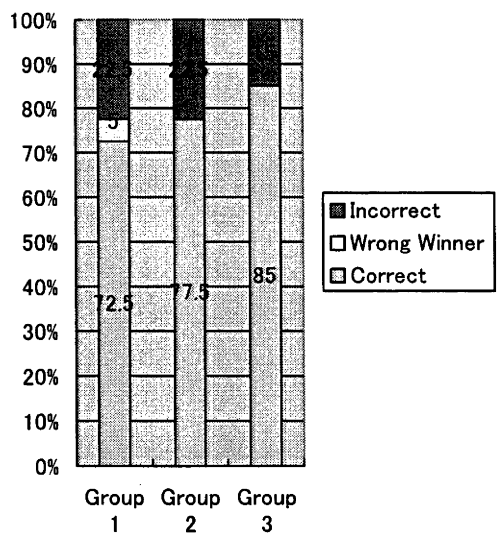


(50) Vowel quality: rising diphthong percentile results

4.3.1.2.7 Rising diphthongs: items

11.[dɛfrel], **31.**[dʒənoUləf], **45.**[hout], **46.**[tɔləbral]

G1 performed at a reasonably high degree, with G2 and G3 performing at a near-native level. Each group's production included a small number of *wrong winners* (communicably acceptable AE/JLN vowel quality), with some incorrect items included in G1 (one wrong vowel quality item and two items subject to orthographic interference from AE's written character 'y' and vowel insert hypercorrection). G2's error was vowel confusion (where the target vowel and following changed place).



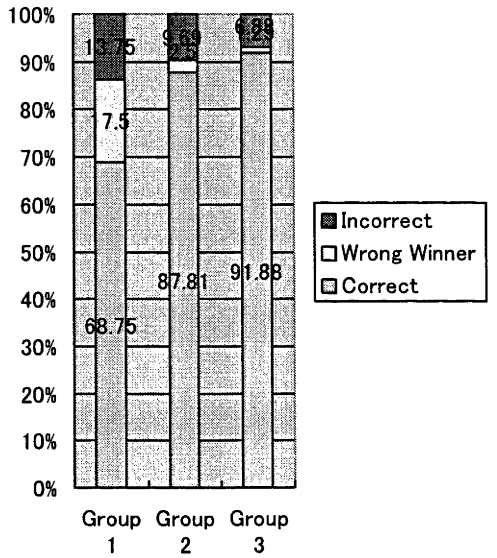
(51) Vowel quality: centring diphthong percentile results

4.3.1.2.8 Centring diphthongs: items

09.[sluə], **38.**[gəstɛə], **47.**[plɔdrlə], **48.**[mɛə]

G1and G2 displayed a comparatively low level, and G3 a slightly higher level of production compared to other natural classes. G1 included two *wrong winner* items, while G1, G2 and G3 all included a sizable section of incorrect items. These incorrect items were accountable through 1) incorrect vowel quality, and 2) hypercorrection of orthography (i.e. 'r').

4.3.1.3 Vowel quality results



(52) Vowel quality: total percentile results

G2 and G3 displayed similarly high production (see (52) left) for all non-central vowels (specifically J/i, e, a, u, o/ and AE rising diphthongs), but low successful production for central vowels/diphthongs (AE/ə, ɜ/) (see (53) below). G1-G3 incorrect production averaged 47.5% for central vowels, and 23.3% for centring diphthongs, compared to an average incorrect response rate of 1.75% for non-central vowels and diphthongs.

Correct	*Wrong winner*	Total	Incorrect
(5) G1=24, G2=38, G3=40	G1=16, G2=2, G3=0	G1=40, G2=40, G3=40 (120)	G1=0, G2=0, G3=0
(6) G1=39, G2=39, G3=40	G1=0, G2=0, G3=0	G1=39, G2=39, G3=40 (118)	G1=1, G2=1, G3=0
(1) G1=28, G2=39, G3=39	G1=12, G2=0, G3=0	G1=40, G2=39, G3=39 (118)	G1=0, G2=1, G3=1
(4) G1=27, G2=36, G3=37	G1=11,G2=4, G3=2	G1=38, G2=40, G3=39 (117)	G1=2, G2=0, G3=1
(7) G1=34, G1=38, G2=38	G1=3, G2=1, G3=2	G1=37, G2=39, G3=40 (116)	G1=3, G2=1, G3=0
(2) G1=24, G2=37, G3=40	G1=12, G2=1, G3=0	G1=36, G2=38, G3=40 (114)	G1=4, G2=2, G4=0
(8)G1=29,G2=31,G3=34	G1=2, G2=0, G3=0	G1=31, G2=31, G3=34 (97)	G1=9, G2=9, G3=6
(3) G1=15, G2=23, G3=26	G1=0, G2=0, G3=0	G1=15, G2=23, G3=26 (64)	G1=25,G2=17,G3=14
G1=27.50 (68.75%)	**G1=7.00 (17.50%)**	**G1=34.50 (86.25%)**	**G1=5.50 (13.75%)**
G2=35.13 (87.81%)	**G2=1.00 (2.50%)**	**G2=36.13 (90.31%)**	**G2=3.88 (9.69%)**
G3=36.75 (91.88%)	**G3=0.50 (1.25%)**	**G3=37.25 (93.13%)**	**G3=2.75 (6.88%)**

(53) Vowel quality: total scores

A limited number of items affected by vowel reduction/neutralization (as delineated by Suzuki 1984 and Akamatsu 1997) and deletion (Weinberger 1994) were present, although by far the most common characteristic aside from correct responses were the incorrect and *wrong winner* responses.

G1 also displayed a slightly lower high level of production for non-centrals and difficulty with central vowels and centring diphthongs. However, the total of communicable

production (correct and *wrong winners*) included in sum 10% *wrong winners* (specifically J/e, a, u/, with most concentrated in J/a/ (36.84%), J/u/(35%)). These *wrong winners* were most defined in these non-central vowels with allophonic difference between AE and JLN.

G1, G2 and G3 production indicates that JLN vowels are acquired similarly to JLN consonants, with the closest items to AE acquired first with some foreignness (*wrong winners*). Quality approaches native level by G2, 3. Central vowels and centring diphthongs share similarities with consonant *unknown partners*, with a significant percentage of learners unable to successfully produce them even by G2 or G3 level.

4.3.2 Vowel duration (length)

4.3.2.1 Predictions for Vowel Duration

Kawarazaki (1979), Akamatsu (1997) and Toda (1994), in works focussing on SJ/NJ, note vowel length control difficulties exist among foreign learners of modern Japanese. However, as noted in Chapter 2: 4.3, both AE and Japanese contain both tense/lax and long/short vowels, indicating AE native-speaker students of Japanese are naturally capable of controlling vowel length in their native language which may be transferable to JLN. The question exists "will subjects show this same difficulty seen in SJ/NJ, in LJ items naturalized to Japanese which reflect the length of the original item?" and "what affects this difficulty in LJ vowel duration control?"

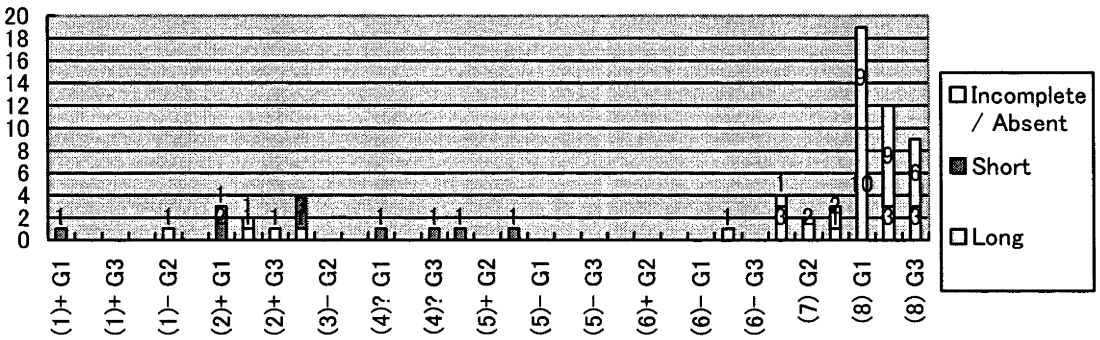
AE native speakers are intimate with tense/lax vowel quality, and the present study predicts: (i) little difference in performance between tense/lax vowels. The predictions are suggested that (ii) some vowels will be subject to more errors of vowel length, and (iii) these errors will gradually decrease toward native-like production.

4.3.2.2 Vowel duration focus/tables and figures

As in 4.3.1, 32 items (4 items for each of the 8 vowel groups) were selected. The selected items included word-initial, medial and final vowel targets.

The following tables show G1, G2 and G3 responses in score form (see (63)) and in percentile form ((55) – (62), and total results in (64)), as calculated from Appendix 5: Production Lists to Appendix 6: Production Tallies. (54) divides JLN phonemes into lax/tense vowel inputs, with G1, G2 and G3 responses tabulated in the left column, and the total in the right column; (55) – (62) divide G1, G2 and G3 responses for each class into Correct [Long / Short] Absent classification of quantity; (63) provides a ranking of production difficulty for each class, with the lowest the most difficult, and highest most successful. The second row indicates G1, G2 and G3 sum total production.

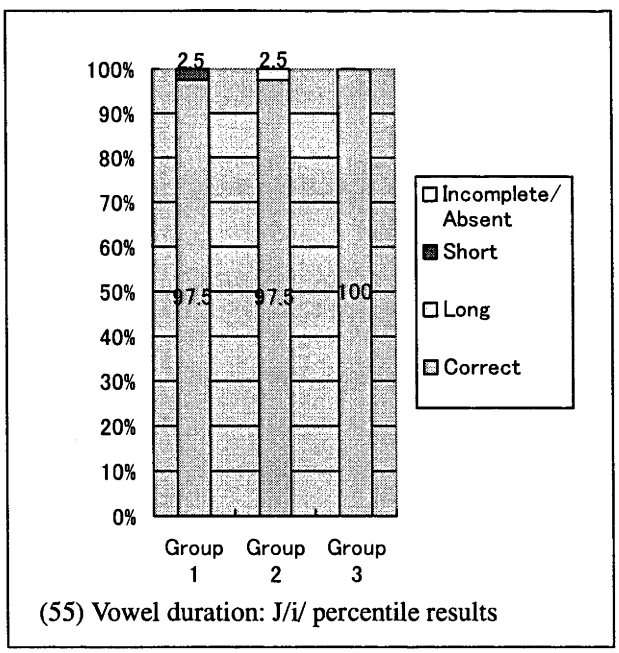
4.3.2.2.A Incorrect responses



(54) Vowel errors by lax/tense vowel type

The possibility of tense/lax vowel quality interfering with vowel length production was investigated, but showed little difference with tense (+) and lax (-). The greatest concentration of incorrect responses were the long and incomplete/absent (7) rising and (8) centring diphthongs items.

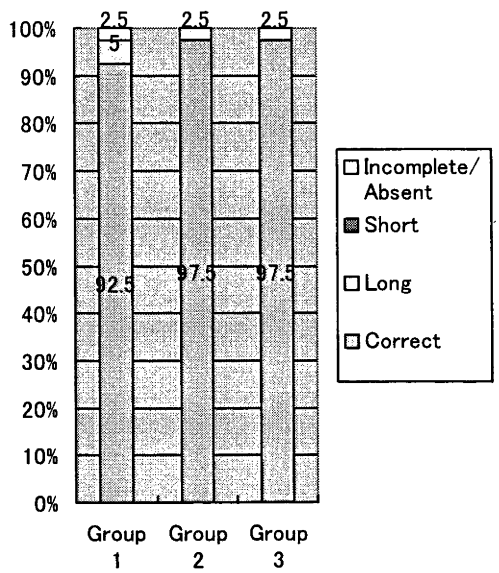
4.3.2.2.B Vowel duration



(55) Vowel duration: J/i/ percentile results

4.3.2.2.B.1 J/i/: items 12. [ji:ld], 14. [tIdÞks], 18. [pju:gi:], 19. [eIs]

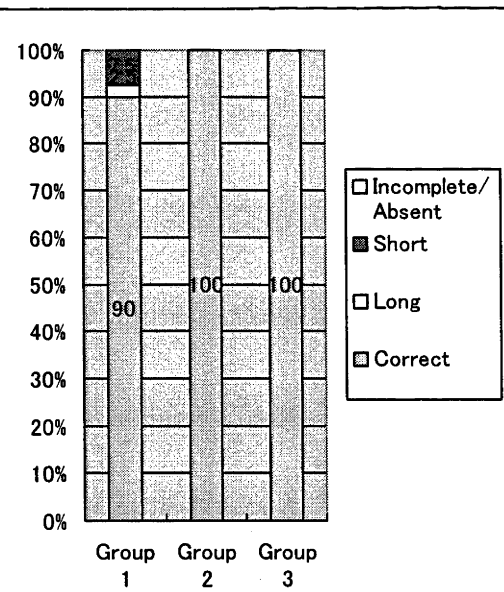
G1, G2 and G3 all displayed native-like production. G1 production included one short, and G2 included one long item.



(56) Vowel duration: J/e/ percentile results

4.3.2.2.B.2 J/e/: items 10. [dɛlvz], **11.** [dɛfrel], **21.** [djurʌplɛks], **44.** [slɛʃ]

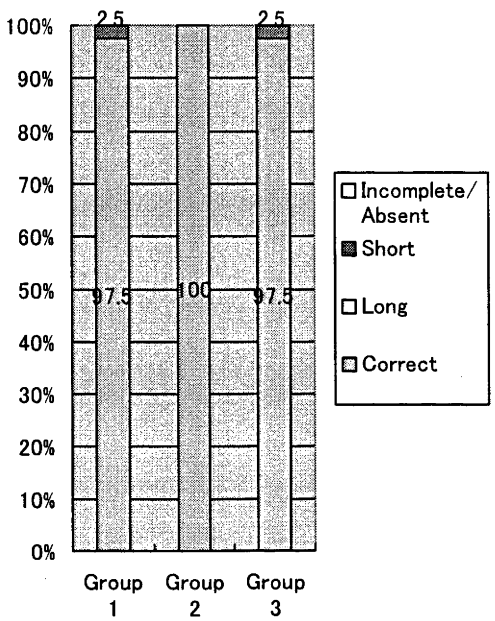
G1, G2 and G3 all displayed native-like production. G1 included two long, and one completely absent item. G2 and G3 included one long item each.



(57) Vowel duration: central vowel percentile results

4.3.2.3.B.3 Central vowels: items 04.[flɜ:d], **08.**[ətrautʃ], **22.**[zʌbɜ:b], **31.**[dʒənoUləf]

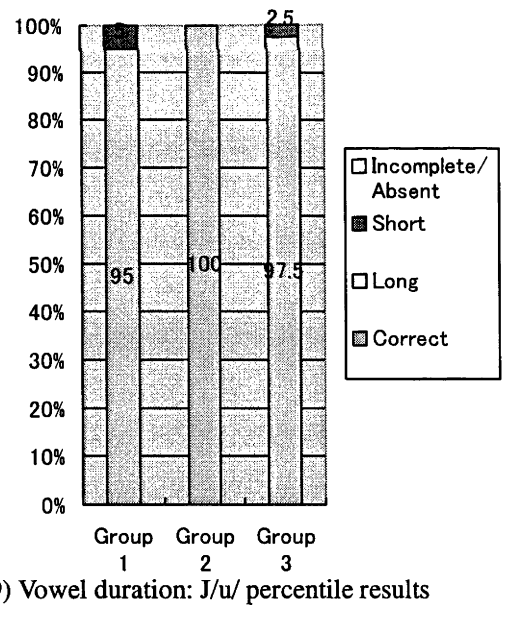
G1, G2 and G3 demonstrated high-level production, also G1's responses included 1 long, and 3 short items. 2/3 short items were subject to orthographic interference ([bɜ:b] > *[bar(ɯ)b]).



(58) Vowel duration: J/a/ percentile results

4.3.2.2.B.4 J/a/: items 07.[mʌːʤ], 13. [bltmæp], 22.[zʌbɜːb], 26.[mjænmaː]

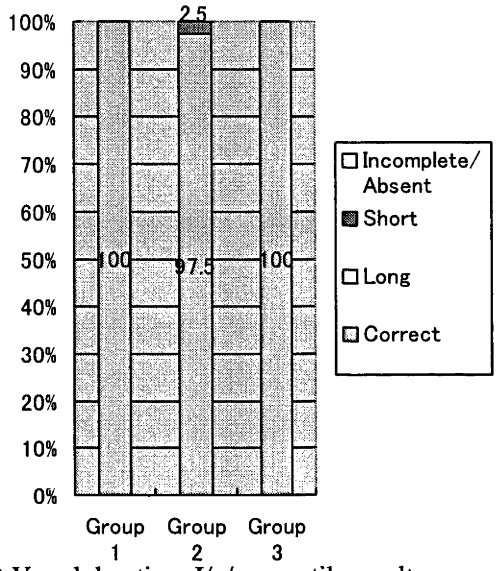
G1, G2 and G3 all demonstrated native-like production. G1 and G2 had one short item each subject to orthographic-interference by the written character "r" ([aː] > *[arɯ]). The author notes that this phenomenon is also observed word-finally (item 26, with 4/10 G1 responses, 2/10 G2 responses, and 1/10 G1 responses affected).



(59) Vowel duration: J/u/ percentile results

4.3.2.2.B.5 J/u/: items 18.[pjuːgiː], 21.[djurʌplɛks], 34.[wɒmpʊt], 35.[tʊp]

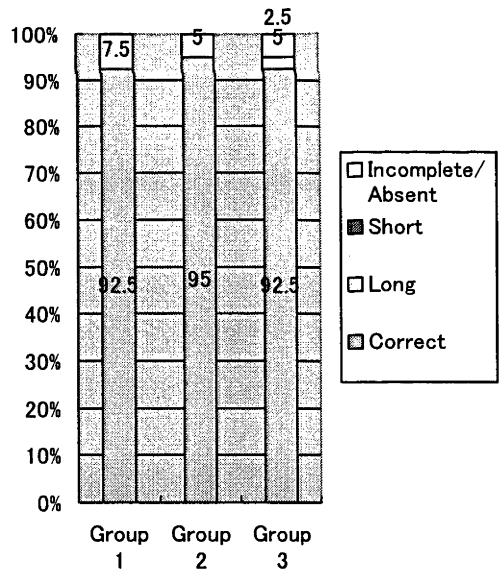
G1, G2 and G3 all demonstrated native-like production, except for G1's two (including one response followed by a missing speech-sound segment), and G3's one (followed by the deletion of an entire syllable) short responses.



(60) Vowel duration: J/o/ percentile results

4.3.2.2.B.6 J/o/: items 01.[wɒʃt], 14.[tɪdɒks], 46.[tɔləbral], 47.[plɔdrlə]

G1, G2 and G3 all demonstrated native-like production. G2 included one long response.

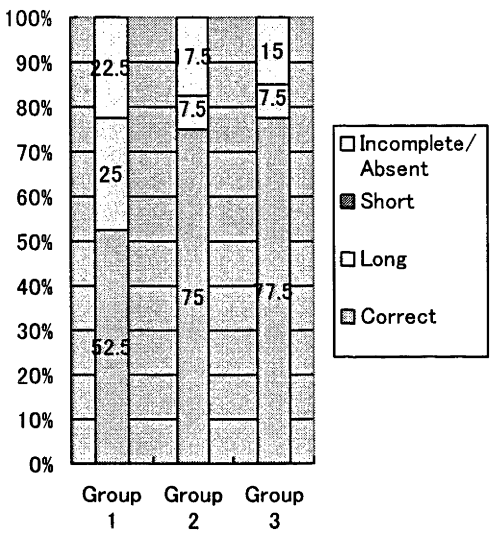


(61) Vowel duration: rising diphthong percentile results

4.3.2.2.B.7 Rising diphthongs: items 11.[dɛfreɪ], 31.[dʒənoʊləf], 45.[hout], 46.[tɔləbral]

G1, G2 and G3 all demonstrated native-like production. G1 included 3 long responses; these were [eɪ] and [aɪ] items where the first half of the diphthong was lengthened. Two of these responses also showed orthographic interference with [ɪ] interpreted as the written "y" and hyper-corrected for vowel insertion. G2 included two long responses with one item having the first half of the diphthong lengthened, and the second item vowel confusion (the target vowel item and the following vowel changed place). G2 included 2 incomplete items; one, where [ou] was substituted for the monophthong [o], and a second

item where the second half of the diphthong was lengthened. G3 also included one overly-long CV item.



(62) Vowel duration: centring diphthong percentile results

4.3.2.2.B.8 Centring diphthongs: items 09.[sluə], 38.[gəstɛə], 47.[plɔdrlə], 48.[mɛə]

G1, G2 and G3 all displayed performance well below that of all other vowel groups, with G1 poorest and G2 and G3 slightly higher.

G1 had 10 overly long responses, with all being diphthong first half lengthening. G1 also had 9 incomplete responses (5 being the diphthong's latter half [ə] being mistaken for the written character "r" - thus [vɪə] produced > [vɪrV]); G1's remaining 4 incomplete responses included 3 items including the diphthong's first half only, and 1 item with only the latter half.

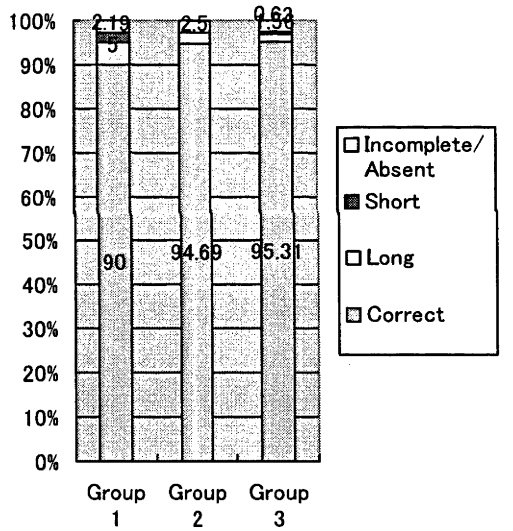
G2 included 3 overly long diphthong first half items. G2 also had 9 incomplete items, with 4 of these including only the diphthong's first half, and the remaining 5 items [ə] > [r] responses.

G3 included 3 overly long diphthong latter half items. G3 also included 6 incomplete items, with 3 being the diphthong's first half only, and the other 3 items being [ə] > [r] responses.

4.3.2.3 Vowel duration results

Correct		Long	Short	Incomplete/Absent
(6) j/o/	G1=40, G2=39, G3=40 (119)	G1=0, G2=1, G3=0	G1=0, G2=0, G3=0	G1=0, G2=0, G3=0
(4) j/a/	G1=39, G2=40, G3=39 (118)	G1=0, G2=0, G3=0	G1=1, G2=0, G3=1	G1=0, G2=0, G3=0
(1) j/i/	G1=39, G2=39, G3=40 (118)	G1=0, G2=1, G3=0	G1=1, G2=0, G3=0	G1=0, G2=0, G3=0
(5) j/u/	G1=38, G2=40, G3=39 (117)	G1=0, G2=0, G3=0	G1=2, G2=0, G3=1	G1=0, G2=0, G3=0
(3) centr.	G1=36, G2=40, G3=40 (116)	G1=1, G2=0, G3=0	G1=3, G2=0, G3=0	G1=0, G2=0, G3=0
(2) j/e/	G1=38, G2=39, G3=39 (116)	G1=2, G2=1, G3=1	G1=0, G2=0, G3=0	G1=0, G2=0, G4=0
(7) RisDp	G1=37, G1=38, G2=37 (112)	G1=3, G2=2, G3=1	G1=0, G2=0, G3=0	G1=0, G2=0, G3=2
(8)CenDp	G1=21, G2=28, G3=31 (80)	G1=10, G2=3, G3=3	G1=0, G2=0, G3=0	G1=9, G2=9, G3=6
G1=36.00 (90.00%)		**G1=2.00 (5.00%)**	**G1=0.88 (2.19%)**	**G1=1.13 (2.81%)**
G2=37.88 (94.69%)		**G2=1.00 (2.50%)**	**G2=0.00 (0.00%)**	**G2=1.13 (2.81%)**
G3=38.13 (95.31%)		**G3=0.63 (1.56%)**	**G3=0.25 (0.63%)**	**G3=1.00 (2.50%)**

(63) Vowel duration: total scores



(64) Vowel duration: total percentile results

Subject cells G1, G2 and G3 displayed native-like vowel length production (see (64), left). Little difference in the ratio of errors and correct productions among the three subject cells in terms of the tense/lax nature of vowels (see (54) above); however, a sizeably larger number of errors was observed in (8) centring diphthongs than in the responses to (1) - (6) (monophthongs) or (7) (rising diphthongs). Production of centring diphthongs was poor among G1 subjects, and slightly higher among G2 and G3 subjects (see (63) above).

The relatively limited number of errors were characterized as follows in (65) below:

(1)-(6) errors	(1) absent	e >
	(2) short	i: > i(ɑ)
	(3) long	ɯ > ɯ:
	(4) long/orthog.	a: > a(:) rɯ
(7) errors	(1) incomplete (latter half)	no: > no, ei > e
	(2) long (first half)	ei > e:I
	(3) long (latter half)	o(ɯ/:) > oɯ:
	(4) long/orthog.	ei > e(i/j)ɯ
	(5) vowel confusion	o: e > e o:
(8) errors	(1) long (first half)	ɯa > ɯw:a
	(2) long (latter half)	ɯa > ɯa:
	(3) incomplete (first half)	ea > a:
	(4) incomplete (latter half)	ea > e:, ɯa > ɯ:
	(5) incomplete (latter half)/orthog.	ɯa > ɯ(:) r, ea > e(:) r

(65) Vowel duration/form errors

Monophthong errors consisted of absent, short and long productions. Of the long items, orthographic interference from English was present in central vowel [ɜ] and /a/, suggesting influence by the written English letter "r" due to subjects linking these sounds with what they thought would be their original spelling in English.

Rising diphthong errors consisted of incomplete (with the diphthong's latter half absent) and long (with the diphthong's first or latter halves affected) items. The same type of orthographic interference from English as noted above was found in some long items, with results suggesting subjects thought that the original spelling of the word would be the letter "y" in English, with this inferring in some rising diphthongs.

Centring diphthong errors consisted of long (with the diphthong's first or latter halves affected) and incomplete (with the diphthong's first or latter half absent) items. Orthographic interference from English was observed in many of the incomplete items with the latter half of the diphthong absent. Subjects appeared to have difficulty naturalizing the [ə] in the centring diphthong items, due the subjects perceiving these sounds as being the English letters "r"/"er".

These results suggest LJ length in items replicating their original foreign language form are not as subject to vowel duration difficulties as the NJ/SJ items detailed by Akamatsu (1997) and Toda (1994). JLN vowel length difficulties appear to arise more from unfamiliarity with *wrong winner* vowels and diphthongs than +/- tension control.

4.3.3 Vowel Naturalisation discussion

2.4.3 detailed the greater number of monophthongs and diphthongs of AE that naturalise into the smaller vowel inventory possessed by JLN. 2.4.3.1 highlighted a number of levels of difficulty possible when producing vowels, first of which was phonemic level difficulty. In 2.4.3, we established that AE front and back monophthongs, as well as rising diphthongs, to be similar to JLN vowels on a phonemic level. The results of 4.3 confirmed this stance, with native-like correct phonemic production of all front and back monophthongs and diphthongs observable in all subject group responses. Conversely, while the level of correct phoneme selection was high among all groups for front and back vowels and rising diphthongs, selection of the correct vowel for central vowels and centring diphthongs was poor in all groups, with incorrect selection of central vowels lowest among G1 at 62.5%, G2 at 42.5% and G3 at 35%. As explained in Chapter 4, where two or more phonemes converge to one in the target language, the less similar of the phonemes in the first language (*'unknown partners'*) appears to be difficult for learners to acquire, with this being the case with central vowels. Learners in the present study either maintained the original AE central vowel quality, or selected the incorrect vowel phoneme; however, further research would be required to ascertain whether such incorrect production is due wholly to *'unknown partner'* unfamiliarity with the correlating JLN phoneme, or the neutralisation referred to by Akamatsu in 2.5.3.1. Although production rose somewhat for the central vowels in accordance with competency level (and thus supported the hypothesis JNLP competency will rise in proportion to overall Japanese competency), the advanced G3 subjects were only able to achieve a 65% correct production rate for central vowels, highlighting the level of difficulty this type of vowel possesses.

A second level of difficulty is that of allophonic/phonetic level production, in which, while the learner's phoneme selection is correct, their allophonic production, while

still being communicable, is not compatible with the allophones used by native speakers (*'wrong winners'*). *Wrong winners* were present in around 30% of G1 vowel production evaluated by the current survey, and diminished significantly in G2 and G3 production, indicating *wrong winner* production occurs mainly at G1 level, with G2 and G3 speakers closely approaching native-like production. This *'wrong winner'* production included stressing/tensing the vowel, as noted by Suzuki (1984). This result once again supports the hypothesis JLN competency rises in proportion with overall Japanese competency.

G1, G2 and G3 production of JLN vowels shows similarities with JLN consonant production, in that the closest items to AE are acquired first with some foreignness (*'wrong winner'*). Quality approaches native level by G2 and G3. However, central vowels and centring diphthongs, as is the case with consonant *'unknown partners'*, are unsuccessfully produced by a sizeable number of learners, even at G2 or G3 level.

Although vowel duration is noted by Kawarazaki (1979), Akamatsu (1997) and Toda (1994) to affect communicability, little sign of such difficulty was observed in the current study's duration results (4.3.2). Cells G1, G2 and G3 demonstrated native-like production with all the monophthongs and rising diphthongs, although difficulty in producing centring diphthongs was observed in G1, and to a less extent in G2 and G3. In this way, learners seem to be able to control duration successfully from G1. It could thus be said that the main difficulty faced by learners in terms of VN is the naturalisation of vowel quality, in particular staggered phonemic-level difficulties with central vowels and centring diphthongs, and allophonic-level vowel quality difficulties with G1 level learners.

4.4 Consonant Naturalisation

In Section 4.4, I will discuss Consonant Naturalisation (CN), the fourth JLN stage. I will firstly deal with a consonant quality survey in 4.4.1 and then with consonant moraic unit assessment in 4.4.2 (c.f. overall moraic structure is dealt with in section 4.5.).

4.4.1 Consonant quality

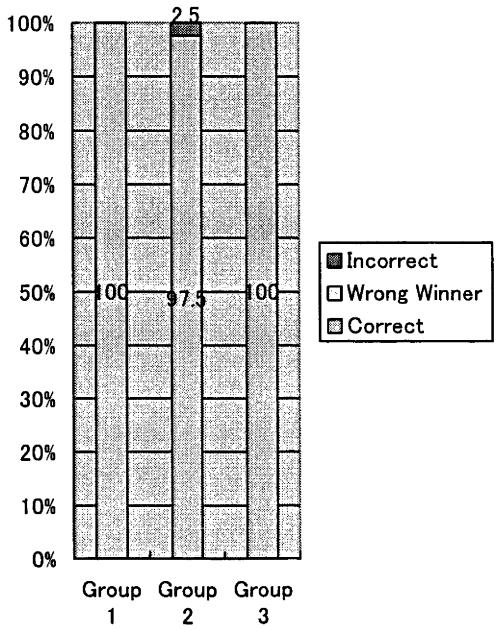
4.4.1.1 Predictions for consonant quality

As noted in Chapter 2:4.3, AE and JLN have corresponding phonemes (with some allophonic differences), as well as diverging phonemes. The present study predicts (i) AE consonant interference in production of corresponding phonemes (*'wrong winners'*), and (ii) difficulty in members of converging phonemes not found in Japanese in JLN phonemes (*'unknown partners'*). Additionally that correct production will heighten towards native-like levels.

4.4.1.2 Consonant quality focus/tables and figures

24 items (4 items for (i) + stops/affricates, (ii) - stops/affricates, (iii) + fricatives, (iv) – fricatives, (v) nasals and (vi) glides/liquids) were analyzed for correct production, incorrect Japanese/AE/other interference, or absence. The target structure was the consonant quality of the consonant sound in target morae.

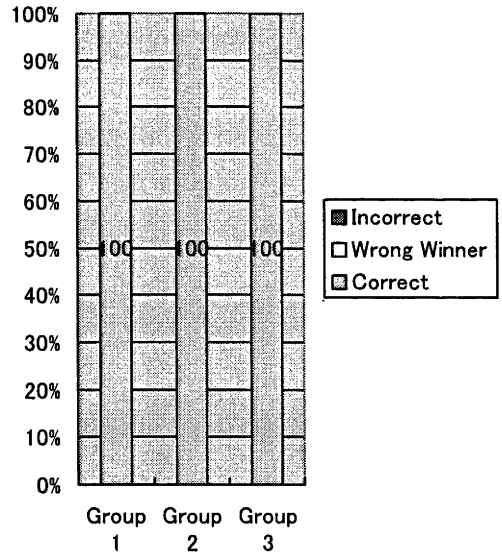
The following tables show G1, G2 and G3 responses in percentile form ((66) – (71), (73)) and in score form (see (72) below), as calculated from Appendix 5: Production Lists to Appendix 6: Production Tallies; (66) – (71) are constructed on a natural class basis, and subdivided into production by G1, G2 and G3 columns denoting Correct/*wrong winner* allophone, Incorrect (Incorrect/deletion) in percentile formats; (72) details a ranking of difficulty of G1, G2 and G3's production by consonant natural class; (73) is formatted identically to (66) – (71) and is a sum total of overall performance.



(66) Consonant quality: Voiceless stops/affricate percentile results

4.4.1.2.1 Voiceless stops/affricates (/k, t, p, ʧ/): items 14.[tIdÞks], **17.** [kʊmba:], **18.**[pju:gi:], **30.**[ʧɜ:n]

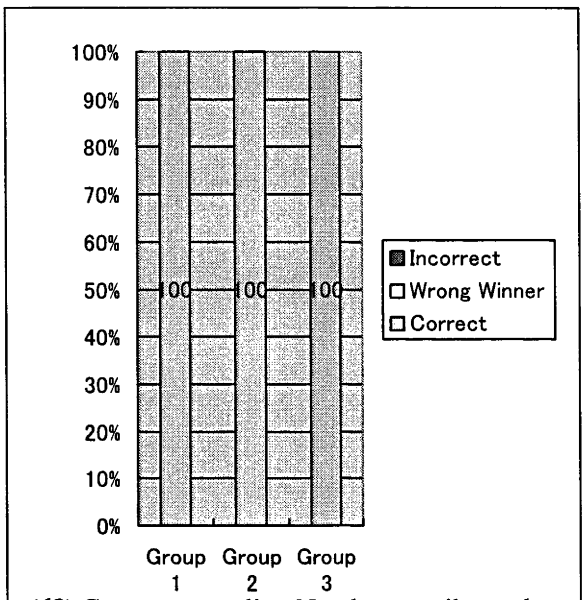
All groups achieved high correct production. Items 14, 17, 18 and 30 are corresponding phonemes with little allophonic differences between AE and JLN.



(67) Consonant quality: Voiced stops/affricate percentile results

4.4.1.2.2 Voiced stops/affricates (/g, d, b, ʤ/): items 20.[gu:n], **21.**[djurʌplɛks], **22.**[zʌbɜ:b], **31.**[ʤənoUlәf]

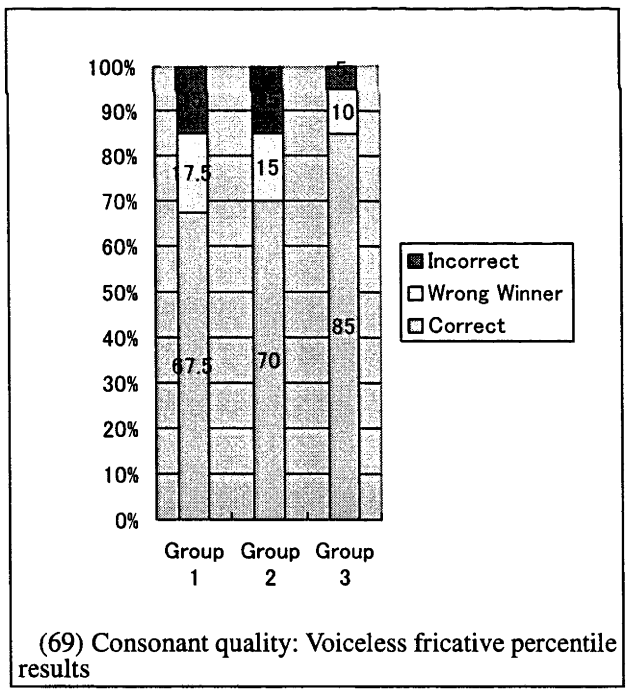
All groups achieved high correct production. Items 20, 21, 22 and 31 are corresponding phonemes with little allophonic differences between AE and JLN.



(68) Consonant quality: Nasal percentile results

4.4.1.2.3 Nasals (/m, n, N/): items 24.[nɪftɪk], 25.[ɪlu:n], 26.[mjænma:], 27.[pɪɪŋk]

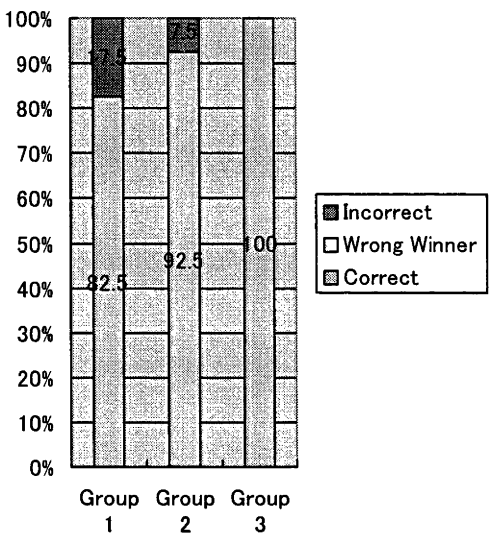
G1, G2 and G3 all demonstrated the highest successful phoneme production. Items 24, 25, 26 and 27 were all correlating sounds with no allophonic differences.



(69) Consonant quality: Voiceless fricative percentile results

4.4.1.2.4 Voiceless fricatives (/f, s, θ, ʃ,h/): items 16.[græʃ], 19.[θɪs], 28.[fu:tɪ], 45. [hout]

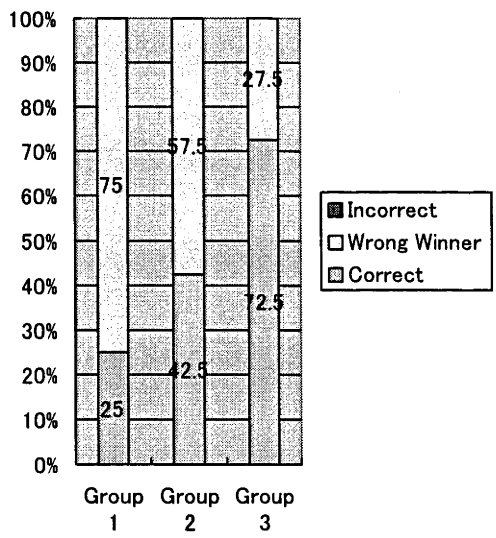
G1, G2 and G3 all demonstrated graduating difficulties in production. The sum total of all groups *wrong winners* were found in Item 28 with a stronger aspirated [f] than the [ɸ] found in JLN, but existent in AE, showing some L1 interference. In addition, the entirety of all groups incorrect responses were found in Item 19, which contained the sound [θ], realized in Japanese as the unknown partner in J/ʃ/. Respondents displayed no difficulties in the production of the corresponding phonemes /h/ or /ʃ/.



(70) Consonant quality: Voiced fricative percentile results

4.4.1.2.5 Voiced fricatives (/v, z, ð, ʒ/): items 15.[zʌʧ], 22. [zʌbɜ:b], **23.**[tauð], **29.**[vɪpə:]

G1, G2 and G3 all demonstrated graduating difficulties in production. While none of the subject groups exhibited difficulties with the corresponding phoneme /z/, G1 and G2 showed graduating difficulty in Item 23 with the sound /ð/, realized in Japanese as the *unknown partner* in J /z/.



(71) Consonant quality: Glide/liquid percentile results

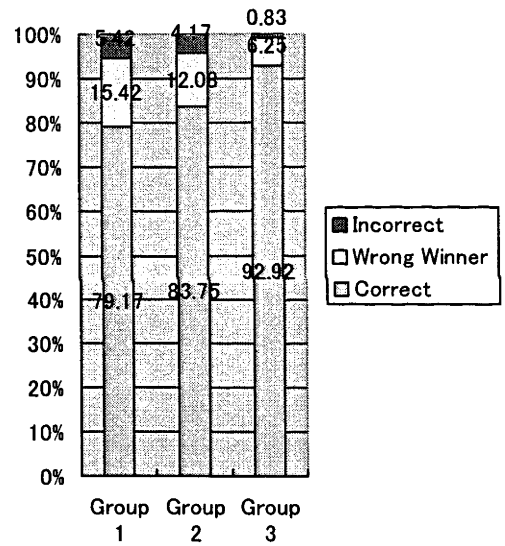
4.4.1.2.6 Glides/liquids (/r, j, w/): items 12.[ji:ld], **32.**[plɜ:t], **33.**[wum], **34.** [wÞmpʊt]

G1, G2 and G3 demonstrated graduated, but low correct production in comparison with other natural class groups. /r, j, w/ represented same phonemes in both AE and JLN but possess different allophonic realizations, resulting in a high number of *wrong winners*. Responses for each item for each group indicated a roughly similar share by each group of *wrong winners* over all items tested from this class.

4.4.1.3 Consonant quality results

Correct phoneme	*Wrong winner*	Combined	Incorrect
(3) G1=40, G2=40, G3=40	G1=0, G2=0, G3=0	G1=40, G2=40, G3=40	G1=0, G2=0, G3=0
(2) G1=40, G2=40, G3=40	G1=0, G2=0, G3=0	G1=40, G2=40, G3=40	G1=0, G2=0, G3=0
(1) G1=40, G2=39, G3=40	G1=0, G2=0, G3=0	G1=40, G2=39, G3=40	G1=0, G2=1, G3=0
(6) G1=10, G2=17, G3=29	G1=30, G2=23, G3=11	G1=40, G2=40, G3=40	G1=0, G2=0, G3=0
(5) G1=33, G2=37, G3=40	G1=0, G2=0, G3=0	G1=33, G2=37, G3=40	G1=7, G2=3, G3=0
(4) G1=27, G2=28, G3=34	G1=7, G2=6, G3=4	G1=34, G2=34, G3=38	G1=6, G2=6, G3=2
G1=190/240 (79.17%)	G1=37/240 (15.42%)	G1=227/240 (94.58%)	13/240 (5.42%)
G2=201/240 (83.75%)	G2=29/240 (12.08%)	G2=230/240 (95.83%)	10/240 (4.17%)
G3=223/240 (92.92%)	G3=15/240 (6.25%)	G3=238/240 (99.17%)	2/240 (0.83%)

(72) Consonant quality: total scores



(73) Consonant quality: total percentile results

As seen in (73), G3 showed the greatest number of correct productions, and least *wrong winners* (G1 and G2 had comparatively 2 times more *wrong winners*), notably [f, r, w, j]. All levels displayed difficulty with incorrect production of *unknown partners* in converging phonemes, notably [ɵ, ð].

4.4.2 Consonant Moraic Units

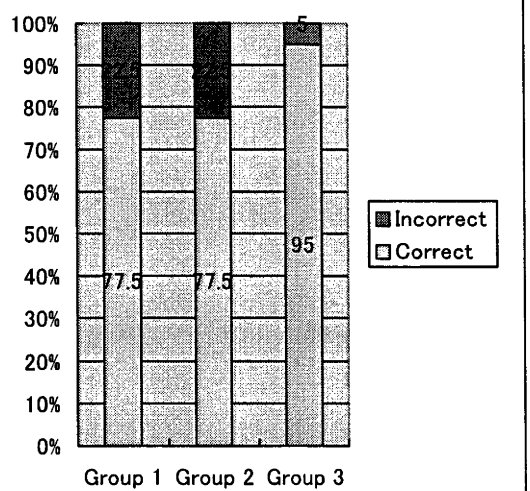
4.4.2.1 Predictions for consonant moraic units

The author predicts (i) OS hypercorrection interference; (ii) AE consonant and vowel quality interference; (iii) difficulties in *unknown partners*; (iv) difficulties in syllabic structures other than C and CV.

4.4.2.2 Consonant moraic unit focus/tables and figures

Production was assessed for the total moraic unit production determined in Chapter 6. Moraic unit production is further discussed in terms of combination of consonant and vowel phonemic/allophonic selection and syllabic structure below.

The following tables show G1, G2 and G3 responses in percentile form ((74) – (80)) and in score form (see (81) below), as calculated from Appendix 5: Production Lists to Appendix 6: Production Tallies; Divided into natural class ((74) – (79)), G1, G2 and G3 responses were divided into columns with total number of correct productions and the representative percentage. (80) represents the sum percentile results; (81) details the unit production by natural class, followed in the following row by sum total unit production of all classes for G1, G2 and G3.

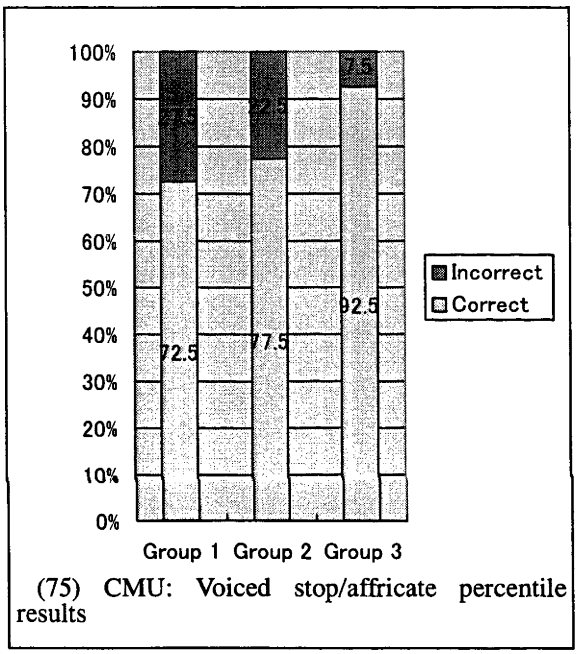


(74) CMU: Voiceless stop/affricate percentile results

4.4.2.2.1 Voiceless stops/affricates: items 14.[tIdÞks], 17. [kumba:], 18.[pju:gi:], 30.[tʃɜ:n]

G3 production included one incorrect response attributable to incorrect consonant naturalisation in Item 14 [ti] at a value of G3=1/2 of total errors for this class. G1 and G2 displayed syllabic structure AE interference in Item 18 [pju] at G1=3/9, G2=5/9, with all the subjects who gave incorrect responses unable to produce a CjV structure, instead offering a

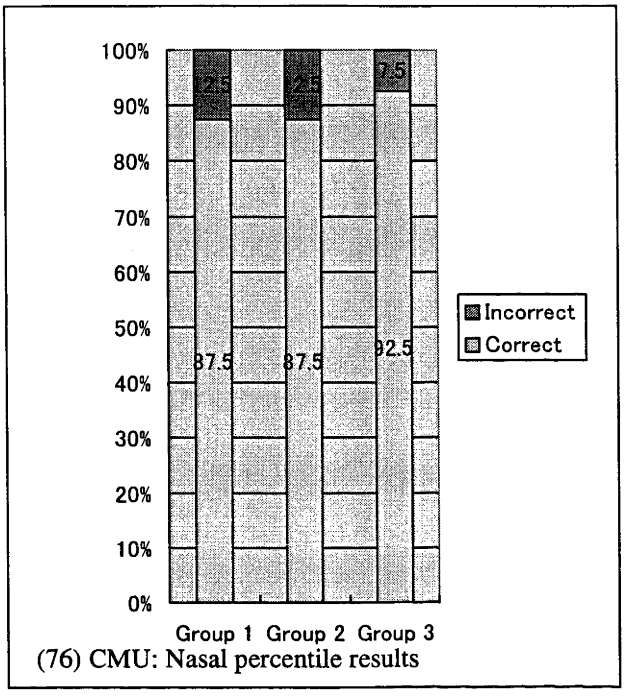
CVjV structure as in [pijɯ] or [pejɯ]. Errors were found in Item 30 [ʧɜ] at G1=5/9, G2=4/9, G3=1/2, with the subjects who gave incorrect responses unable to naturalise the vowel quality of this item, either giving the original [ɜ], or breaking up the CV structure with an additional vowel (CVV) as in the [i] in [ʧiɜ]. Syllabic structure difficulties and low acquisition of AE *unknown partners* account for the majority of – stop errors.



(75) CMU: Voiced stop/affricate percentile results

4.4.2.2.2 Voiced stops/affricates: items 20.[guːn], 21.[djurʌplɛks], 22.[zʌbɜːb], 31.[ʤənoUlәf]

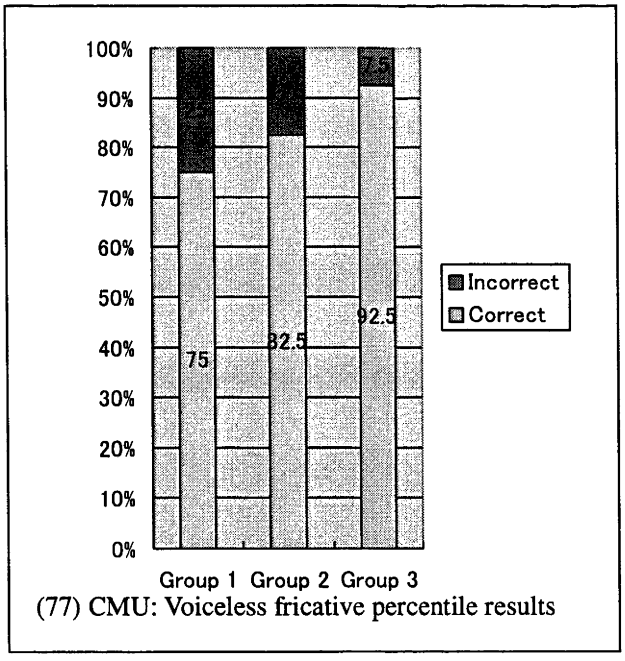
All groups demonstrated some syllabic structure difficulties in Item 21 [dju] at G1=2/11, G2=3/9, G3=1/3 of total voiced stops/affricates errors, with subjects who gave erroneous responses all unable to produce the CjV structure [djɯ], resultantly either simplifying the structure to become [du], or changing the CjV structure to become the CVjV structure [dijɯ] or [dejɯ]. All groups displayed vowel naturalisation difficulties in Item 22 [bɜː] at G1=4/11, G2=4/9, G3=2/3. Errors were found in Item 31 [ʤə] at G1=5/11, G2=2/9. Syllabic structure, low acquisition of AE *unknown partners* and AE interference in vowel naturalisation account for all + stop/affricate errors.



(76) CMU: Nasal percentile results

4.4.2.2.3 Nasals: items 24.[nlftlk], 25.[llu:n], 26.[mjænma:], 27.[pllŋk]

All groups showed some syllabic structure errors Items in 25 /N/ at G1=2/5, G2=1/5, G3=1/3 of the total incorrect productions with respondents who gave an incorrect response generally hypercorrecting N by adding a vowel where none was necessary (the majority of which were [ɯ] inserts), and item 26 [mja] at G1=3/5, G2=4/5, G3=2/3, in which those who gave incorrect responses changed the target structure from CjV ([mja]) to CVV ([mia]), with the vowel quality of this mora frequently maintaining its English vowel quality in this item.

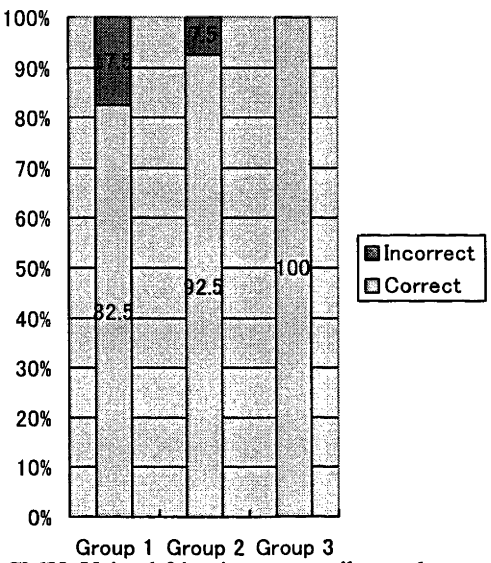


(77) CMU: Voiceless fricative percentile results

4.4.2.2.4 Voiceless fricatives: items 16.[græʃ], 19.[əIs], 28.[fu:tl], 45. [hout]

Archaic OS strategies and unfamiliarity with the *unknown partner* in Item 19 account for all the voiceless fricative errors. In item 16, erroneous (archaic) OS insert was the cause of all incorrect responses for that item (G1=4/10, G2=1/7 and G3=1/3 of total errors). Incorrect consonant selection (due to the target item being an *unknown partner*) was the cause of the remainder of errors, in

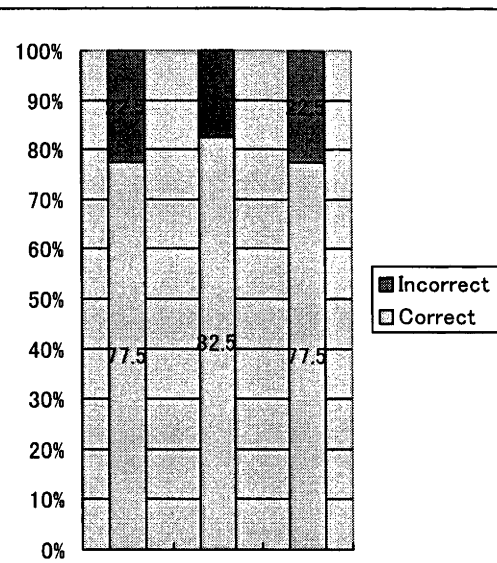
Item 19 (G1=6/10, G2=6/7 and G3=2/3 of total errors).



(78) CMU: Voced fricative percentile results

4.4.2.2.5 Voiced fricatives: items 15.[zʌtʃ], 22. [zʌbɜ:b], 23.[tauð], 29.[vɪpə:]

For the voiced fricatives, incorrect consonant selection (due to the target item being an *unknown partner*) accounts for all the voiced fricative error (G1=7/7, G2=3/3, G3=0 of total errors).



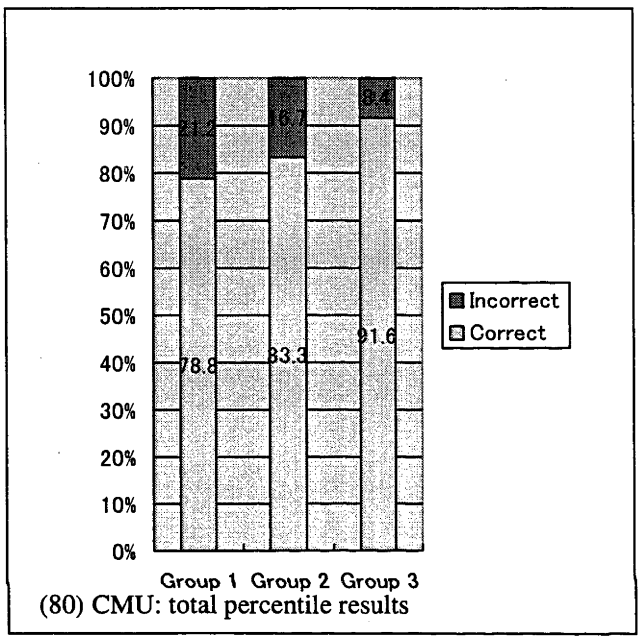
(79) CMU: Liquid/glide percentile results

4.4.2.2.6 Liquids/glides: 12.[ji:ld], 32.[plɜ:t], 33.[wum], 34.[wɒmput]

AE interference in vowel naturalisation and low acquisition of consonant naturalisation rules account for all glide/liquid errors. All groups possessed errors in Item 32 [lɜ] at G1=6/9 G2=6/7, G3=7/9 of the total number of incorrect responses to liquid/glide items. Incorrect production of Item 32 was characterised by both use of the *unknown partner* vowel [ɜ] and some consonant *wrong winner* usage. Item 33 [wu:] errors made up G1=1/9, G2=1/7, G3=1/9 of the total incorrect

liquid/glide productions whereas errors in Item 34 [wo] were at G1=2/9, G3=1/9, with subjects unsure of the naturalisation of the English consonant [w] in Items 33 and 34.

4.4.2.3 Consonant moraic unit results



(80) CMU: total percentile results

The responses of G1, G2 and G3 are rather than the presence or non-presence of any specific errors, characterized by differing levels of presence of these errors (see (80), left). The errors themselves include moraic structure errors in C(j)V (as in [pju] > [pjɯ] *[piɯ]/[pejɯ]) or N structures (OS hypercorrection), consonant *unknown partner* (as in [ð,ɵ]) difficulties, and *wrong winners* (such as [je] > [ie] *[je]). Finally, V was subject to vowel quality difficulty, as in [bɜ:] > [ba:] *[bɜ:]/[be:]. G1 and G2 demonstrated a similar level of production, with G3 more closely approaching native-like production (see (81) below).

	Correct unit productions	Total correct
(5) Voiced fricatives	G1=33, G2=37, G3=40	110
(3) Nasals	G1=35, G2=35, G3=37	107
(1) Voiceless stops/affricates	G1=31, G2=31, G3=38	100
(4) Voiceless fricatives	G1=30, G2=33, G3=37	100
(2) Voiced stops/affricates	G1=29, G2=31, G3=37	97
(6) Liquids/Glides	G1=31, G2=33, G3=31	94
	G1=31.5(78.8%),G2=33.3 (83.3%),G3=36.6 (91.6%)	**608/720**

(81) CMU: total scores

4.4.2.4 Consonant moraic unit discussion

The present study examined production by subjects of consonant moraic units (total production of CV and CjV structures) above to study difficulties shown by subjects when consonant was combined with a vowel or semi-vowel + vowel in the single moraic unit. The results of this examination were in agreement with those noted in the previous vowel quality sections: G1 showed a sizeable number of *wrong winner* consonants and vowels in the CV and CjV structures examined, and both G1 and G2 subjects displayed poor results in the naturalisation of *unknown partners* (although even G3 still had some difficulties here). In terms of actual moraic structure, CV and N were produced most successfully, although CjV structures were subject to some AE CVV structure preference interference as outlined by Aoki 1990, Akamatsu (1997) and Suzuki (1984) who note a tendency for English speakers to pronounce CjV structures as CVV. In general, consonant moraic unit production results also supported the hypothesis that JLN (CN) competency will rise in proportion with learners' overall Japanese competency.

4.4.3 Consonant Naturalisation discussion

2.4.4 detailed the consonants of AE which naturalise into the smaller (although sizably expanded in comparison with SJ/NJ) consonant inventory possessed by JLN. Aoki (1990) suggests this larger consonant inventory possessed by English speaking students suggests such learners should have little difficulty differentiating Japanese consonants.

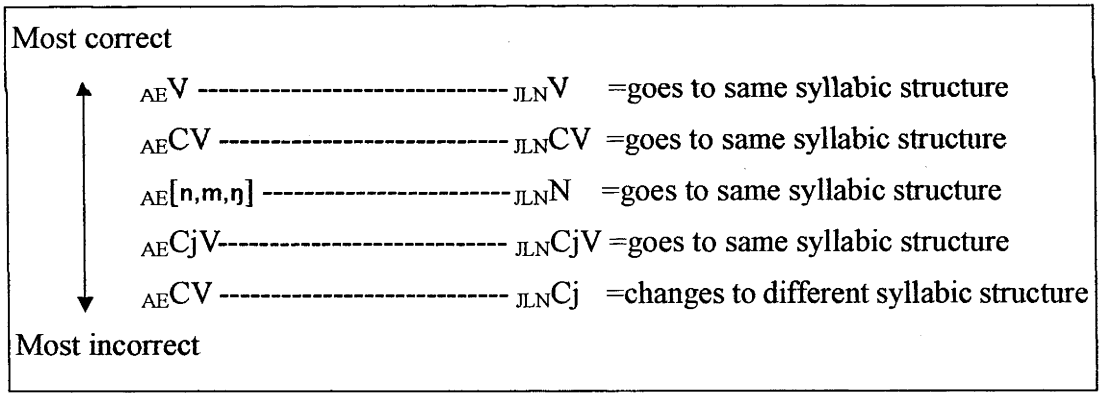
As was the case with vowels, several of types of difficulties exist when producing consonants, the first of which is phonemic level difficulty. While thanks to the expansion of the consonant inventory, a greater number of consonants are in corresponding relationships between AE and JLN, on a phonemic-level, there are still several *'unknown partners'* that learners appeared to find problematic. While G1, G2 and G3 achieved native-like consonant quality in general, a staggered level of incorrect productions, with G1 possessing the greatest number and G3 the lowest, was observed in fricative production, among the items tested that are *'unknown partners'*. The fact that students, despite Aoki's assertion that they are able to differentiate the consonants of Japanese (as well as similar consonants in the expanded JLN inventory similar to those in AE), have difficulties with *'unknown partners'* suggests student difficulties are not due to an inability to differentiate correct consonant phoneme, as much as it suggests that they are unfamiliar with how to naturalise these AE or other language consonants into JLN.

4.5 Moraic Structure

4.5.1 Predictions for moraic structure

As noted in Chapter 2: 4.1.1, both AE and JLN contain CV, V, N and CjV structures. Additionally, each of these structures are found in the NJ and SJ studied by each of the subjects. Previous studies by Aoki (1990) and Akamatsu (1997) have highlighted learner difficulties with CjV structures, and preliminary student written composition checks by the author suggest (i) some OS hypercorrection with N; and (ii) difficulty with CV > CjV JLN transfer.

The current study thus predicts (i) AE > JLN same syllabic structures will be easier to produce than AE > JLN different syllabic structures (as illustrated in (82) below). It also predicts (ii) AE interference will be found in CjV structures; and (iii) OS hypercorrection will be found in N structures.



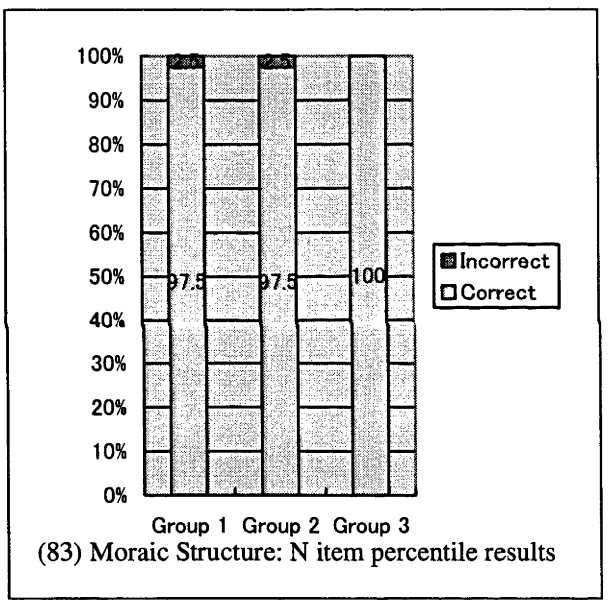
(82) Ranking of expected difficulty of moraic unit production

4.5.2 Moraic structure focus/tables and figures

Structure was examined for break in existent Japanese phonological syllable structures: N, V, CV (semi-vowels /w/ and /j/, which have allophonic phonetic CV realizations are treated in 4.1), and CjV (Q accounted for in 4.2: GF) structures.

Actual consonant/vowel quality is accounted for in 4.4.2 Moraic Units. All items selected were of word-initial placement, except for N items, which are still extremely rare word-initially, and thus were focused upon through word-medial target items.

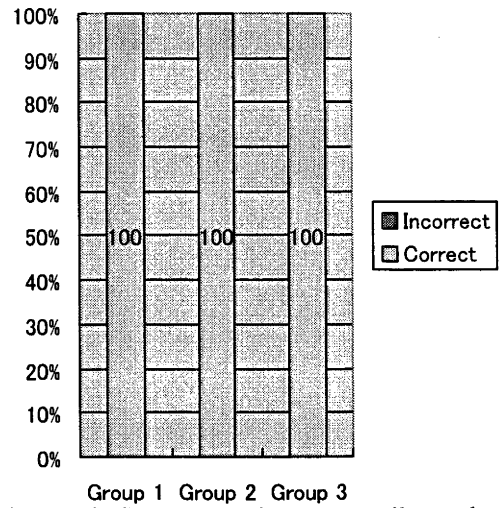
The following tables show G1, G2 and G3 responses in percentile form ((83) – (87), total percentile results in (89)) and in score form (see (88) below), as calculated from Appendix 5: Production Lists to Appendix 6: Production Tallies; (83) – (87) detail each syllabic structure and the number of correct productions by G1, G2 and G3 for that group of sample structures. A brief error analysis follows below each table; (88) describes an order of correctness of syllabic structure production by G1, G2 and G3 divided by syllabic structure type (N, V, CV and CjV), in order from most to least correctly produced (row 1). G1, G2 and G3's total production is shown in the second row. Total percentile results are noted in (89).



(83) Moraic Structure: N item percentile results

4.5.2.1 N: items 05.[bɪntʃt], 06.[mʌndʒ], 26. [mjænma:], 27.[pɪɪŋk]

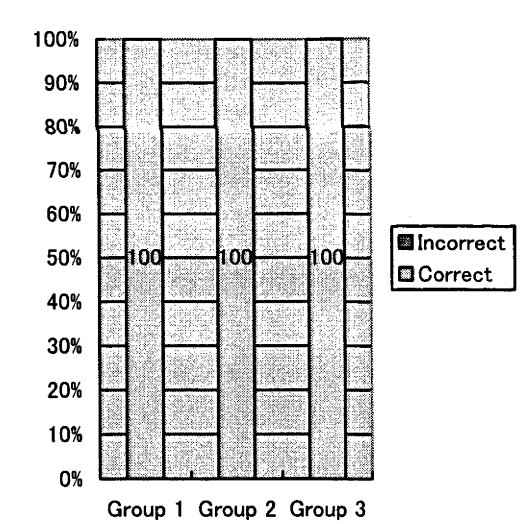
G1, G2 and G3 all displayed high-level production, with G1 and G2 showing only minimal word-medial production difficulties (item 26) medially. An informal look into word-final production (items 25, 30) showed 40% of G1, 15% of G2 and 5% of G3's word-final production of N showed interference from OS hypercorrection.



(84) Moraic Structure: V item percentile results

4.5.2.2 V: 08.[ətrautʃ], 25.[ɪlu:n], 36.[ɜ:ni], 37.[þɪlviə]

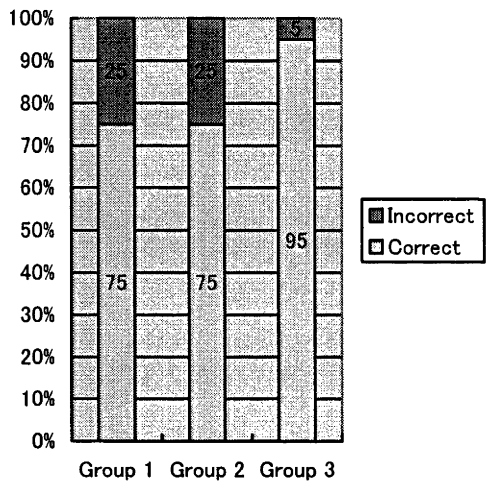
G1, G2 and G3 demonstrated high-level production for AE V> JLN V syllabic structure.



(85) Moraic Structure: CV item percentile results

4.5.2.3 CV: items 06.[mʌndʒ], 24.[nɪftɪk], 29.[vɪpə:] , 38.[gəstɛə]

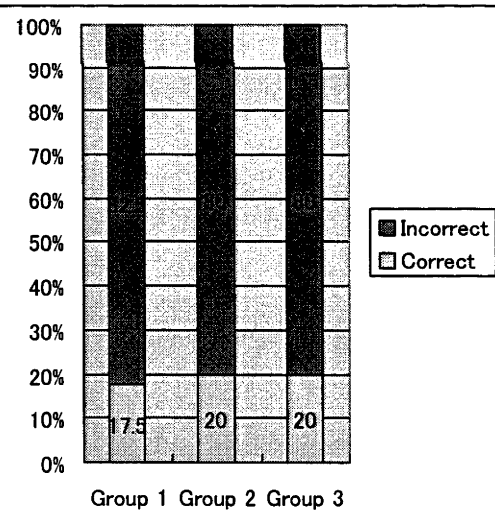
G1, G2 and G3 showed high-level production of CV word-initially.



(86) Moraic Structure: Cjv>CjV item percentile results

4.5.2.4 CjV>CjV: items 18.[pju:gi:], **21.**[djurʌplɛks], **26.**[mjænma:], **39.**[bju:t]

G1 and G2 showed less success with CjV, although G3 showed high-level production. The incorrect production of CjV targets was influenced in all cases by CVV syllabic structure (e.g. [mja] > *[mia]), frequently found in the subject's L1 of AE, an error highlighted by Aoki (1990:228) and Akamatsu (1997:260-1).



(87) Moraic Structure: CV>CjV item percentile results

4.5.2.5 CV>CjV: items 40.[kærəbi:nə], **41.**[kælgu:li], **42.**[gæfə],**43.**[gæɵə]

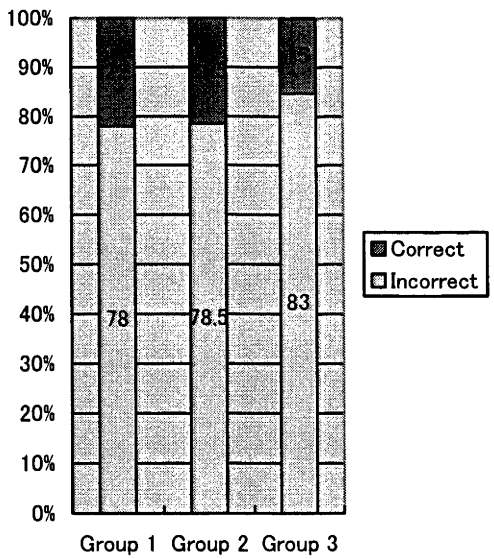
G1, G2 and G3 all displayed extremely poor production for this syllabic structure class, the only class involving a change in syllabic structure status from AE CV ([(k/g)æ]) > JLN CjV, and only before AE/k/ or /g/.

4.5.3 Moraic structure results

Correct structure productions	Total
(2) V G1=40, G2=40, G3=40	120/120
(3) CV G1=40, G2=40, G3=40	120/120
(1) N G1=39, G2=39, G3=40	118/120
(1) CjV G1=30, G2=30, G3=38	98/120
(2) CjV_2 G1=7, G2=8, G3=8	23/120
G1=31.2 (78%), G2=31.4(78.5%), G3=33.2 (83%)	479/600

(88) Moraic Structure: total scores

In conclusion, although (89) depicts similar production for G1, G2 and G3, these are overall average scores and do not reflect individual moraic structure production. V>V and CV>CV appear easiest to transfer structurally, followed by N>N and CjV>CjV (see (88) above), with CV>CjV appearing by far the most difficult to acquire. G1, G2 and G3 produced V and CV (classes found frequently in both AE/JLN, and which involve no syllabic structure change) to a near-native degree. N>N (also found in both AE/JLN) class production was similarly successful, but G1 and G2 subjects showed influence from OS hypercorrection. CjV >CjV (also found in both AE/JLN) was less successful, influenced by AE's more common CV structure. Finally CV>CjV transfers were most difficult with incorrect production residual even in some G3 responses. This class is the only one requiring syllabic structure change, and was even more difficult for subjects than simple CjV production errors discussed by Akamatsu (1997) and Aoki (1990).



(89) Moraic Structure: total percentile results

4.5.4 Moraic structure discussion

The final area analysis conducted by the present study was that of transference of moraic/syllable structure from AE to JLN. While to date this area has received little coverage by researchers of LJ, the author experienced difficulties in this area as a learner as well as noticing that few students were able to correctly produce certain moraic structures much easier than other structures, and decided to examine this formally in the current study. The actual results illustrated that subjects are very competent with producing CV>CV and V>V, as well as N>N (although N is subject slightly to OS hypercorrection) structures, followed next by CjV>CjJ structures (in which learners tended to be prone to producing the CVV structures due to the AE interference noted above). Finally, the most poorly produced moraic structure was the CV>CjV structure, with all groups displaying strikingly poor results. The moraic/syllabic change required to produce these structures is far more difficult to produce than any other structure, and demands more attention by both students and teachers. In summation, while all groups performed poorly in CV>CjV items, G1, G2 and G3 showed native-like moraic structure production for CV, V and N items, with G1 and G2 giving somewhat less correct CjV>CjV productions than G3. This result also supports the hypothesis that JLN competency will rise in proportion with learners' overall Japanese competency.

4.6 Conclusion

An analysis of JLN stages (1) - (4) and the final section (5) moraic structure described the production of three groups of learners (subjects having completed ANU (a) first, (b) second or (c) third year Japanese or equivalent). It highlighted that rather than subjects displaying acquisition of any of the four stages sooner than another, the following quantitative tendencies exist within subject production for each stage.

Open syllabication was produced with reasonable correctness by G1 subjects (who like G2 and G3 showed an *u, o, i* order of correct production) who also included the most absence of OS inserts, and hypercorrection (mostly with *u* inserts). G2 and G3 demonstrated higher success with correct production. Most absence of insert disappeared here, although some hypercorrection (mostly with *u* inserts) could still be found in responses. The results suggest that (i) *u, o, i* order of successful acquisition exists, and that (ii) if absence is frequent, a larger section of hypercorrection will be present than if it were not.

Germinate Formation was produced by G1 and G2 subjects and a lower rate than G3, who performed at a high level, although all groups possessed a level of hyper-correction, indicating all groups still found GF rules somewhat vague.

Vowel Naturalisation quality was affected by a sizable sector of *wrong winners* in G1 responses that was not present in G2 and G3 production. Some vowel reduction to AE central [ə] was observed in G1- G3 responses. Additionally, the naturalisation of central vowels/diphthongs performance was poor (G1) to fair (G3), indicating difficulty for all subject levels. The results suggest G1 productions include a sizable sector of *wrong winners*, which approaches native quality by G2 and G3 levels. The presence of *wrong winners* suggests a lower level of central vowel/diphthong performance.

Vowel duration was of a similarly high level in G1, G2 and G3. However, all groups showed difficulty in the naturalisation of centring diphthongs, influenced by the orthography and unfamiliarity with naturalisation rules, which resulted in the distortion of quality/quantity.

Consonant Naturalisation included graduating large to small sectors of *wrong winners* in diverging phoneme (/r, j, w/) responses from G1 - G3, and graduating sizable to small sectors of incorrect responses for *unknown partners* in converging (/ɵ, s/, /ð, z/ etc)

phoneme groups. This suggests the more *wrong winners* present, the more incorrect productions for *unknown partners* will also be present.

Successful moraic structure was achieved by G1, G2 and G3 in V, CV and N structures, although G1, and to a much lesser extent G2 and G3 showed some OS hypercorrection with N. G3 demonstrated native-like performance with CjV structures, with G1 and G2 performing at a lower level. Finally, all groups showed extremely poor performance with CV > CjV production.

In this way, while G1 - G3 production did not suggest any one JLN stage as being acquired before another; key quantitative measures, as well as error characteristics were surveyed and identified. These two findings, together with the JLN model presented, can be used in the JLN education of Australian learners.

Appendix 5: Production Lists

G1 survey responses

01	wɒʃt	**02**	mædl	**03**	strʌg
	ɯoʃʃɯto		madorɯ		sɯtoraggɯ
①	woʃɯto	①	maduru	①	sutrʌggɯ
②	woʃɯdo	②	mæddoru	②	sutrʌggɯ
③	woʃɯtu	③	mædə (l >ɾ)u	③	sɯtoragɯ:
④	wæʃitɯ	④	mædorɯ	④	sɯtorʌggɯ
⑤	woʃɯdɯ	⑤	miædoru	⑤	stʃrʌgu
⑥	ɯoʃutɯ	⑥	mad rɯ	⑥	sɯtragɯ
⑦	ɯoʃeto	⑦	madorɯ	⑦	sotoraggɯ
⑧	ɯoʃʃuto	⑧	maddorɯ	⑧	sɯtoraggɯ
⑨	woʃʃɯto	⑨	madorɯ	⑨	sɯtoraggɯ
⑩	woʃʃɯto	⑩	madoɾɯ	⑩	sɯtoraggɯ
04	flɜ:d	**05**	blntʃt	**06**	mʌndʒ
	ɸɯra:do		bintʃito		mandʒi
①	fɾuddɯ	①	bintʃito	①	mandʒu
②	furɜ:do	②	blntʃədo	②	mʌndʒi
③	fɯrɜ:dɯ	③	bintʃite	③	mʌndʒi
④	fɯrɜ:dɯ	④	blntʃito	④	mandʒɯ
⑤	fle:do	⑤	bintʃudu	⑤	mʌndʒu
⑥	fulɜ:ɾɯ	⑥	bintʃuto	⑥	mandʒɯ
⑦	fɯre:do	⑦	bintʃido	⑦	mandʒi
⑧	fɯra:k(a>u)	⑧	bintʃido	⑧	mandʒi
⑨	fɯrɜ:do	⑨	bintʃito	⑨	mandʒi
⑩	ɸɯra:dɯ	⑩	bintʃito	⑩	mʌndʒi
07	ma:dʒ	**08**	ətrautʃ	**09**	sluə
	ma:dʒi		atoraɯtʃi		sɯrɯa
①	ma:dʒu	①	ətrautʃi	①	surua
②	ma:dʒi	②	etorautʃi	②	suru:a
③	madʒi	③	etorautʃɯ	③	sɯrɯ:a
④	ma:dʒi	④	etoraɯtʃɯ	④	sɯrɯ:a
⑤	mʌrdʒi	⑤	etʃrautʃu	⑤	slɯ:a
⑥	ma:dʒɯ	⑥	atoraɯtʃu	⑥	sɯrɯ:ra
⑦	ma:dʒi	⑦	atoraɯtʃ(ɯ>i)	⑦	sɯrɯ:a
⑧	ma:dʒi	⑧	i:toraɯtʃɯ	⑧	sɯrɯa
⑨	ma:dʒi	⑨	ətoraɯtʃi	⑨	sɯrɯa
⑩	ma:dʒi	⑩	etoraɯtʃ	⑩	sɯrɯa

10	dɛlvz	**11**	dɛfrel	**12**	ji:ld
	derɯ(v/b) ɯzɯ		deɸɯre(:/i)		i:rɯdo
①	deruvuzu	①	defurei	①	ji:rudo
②	dɛrɯvɯsɯ	②	dɛ:fɯre:i	②	ji:rɯdo
③	dɛrɯvɯsɯ	③	deɸɯrei	③	jirɯdɯ
④	dɛrɯvɯsɯ	④	dɛɸɯre:	④	ji:arɯdo
⑤	delvusu	⑤	diɸurei	⑤	ji:rudu
⑥	dɛrɯvɯzɯ	⑥	di:ɸɯreiɯ	⑥	ji:rdo
⑦	derɯvəsɯ	⑦	dɛɸɯrei	⑦	(ji>i):rɯdo
⑧	derɯvɯzɯ	⑧	deɸɯrei	⑧	i:rɯdo
⑨	derɯvɯzɯ	⑨	defɯrei	⑨	ji:rɯdo
⑩	derɯvɯzɯ	⑩	diɸɯrei	⑩	ij:rɯdɯ
13	bɪtmæp	**14**	tɪdÞks	**15**	zʌtʃ
	bittomappɯ		tidokkɯsɯ		zattʃi
①	bitomæppu	①	tʃidokkusu	①	zattʃi
②	bɪttomæppu	②	tɪdokkɯsu:	②	zʌttʃi
③	bittÞmæpɯ	③	tidokkɯsɯ	③	zadʒi
④	bɪttomappɯ	④	tʃɪdokkɯsɯ	④	zʌttʃi
⑤	bittomappu	⑤	tidokku	⑤	zʌ: tʃu
⑥	bittomæppɯ	⑥	tidokusɯ	⑥	zattʃi
⑦	bittomæppɯ	⑦	tidokɯsɯ	⑦	zʌ:tʃi
⑧	bittomappɯ	⑧	tidoɋkɯsɯ	⑧	zattʃi
⑨	bittomappɯ	⑨	tidokɯsɯ	⑨	Zattʃi
⑩	bittomappɯ	⑩	tʃidokkɯsɯ	⑩	zattʃi
16	græʃ	**17**	kʊmba:	**18**	pju:gi:
	gɯraʃʃɯ		kɯmba:		pjɯ:gi:
①	guraʃʃu	①	kumba:	①	pjɯ:gi:
②	gɯræʃʃɯ	②	kumba:	②	pjuɋgi:
③	gɯræʃɯ	③	kɯmba:	③	pjɯ:gi:
④	gɯræʃʃɯ	④	kɯmɯba:	④	piɯ:gi:
⑤	guræʃʃɯ	⑤	kɯmba:	⑤	piɯ:gi:
⑥	gɯraʃʃɯ	⑥	kumba:	⑥	pju:gi:
⑦	gɯræʃi	⑦	kɯmba:	⑦	piɯ:gi:
⑧	gəræʃʃi	⑧	kɯmba:	⑧	piɯ:gi:
⑨	gɯræʃʃi	⑨	kɯmba:	⑨	pjɯ:gi:
⑩	gɯræʃʃɯ	⑩	kɯmba:	⑩	pjɯ:gi:

19	ɵls	**20**	gu:n	**21**	djurʌplɛks
	(ʃ/s)isɯ		gɯ:ñ		djɯ:rapɯrekkɯsɯ
①	(t>s)isɯ	①	gu:n	①	ʤuapulekkusu
②	(h>ʧ)lsɯ	②	gu:n	②	ʤu:rapɯrɛkɯsɯ
③	ʤlsɯ	③	gɯ:n	③	du:rapɯrɛkɯsɯ
④	ʃlssɯ	④	gɯ:n	④	ʤiu:ropɯrɛkɯsɯ
⑤	tlssɯ	⑤	gɯ:n	⑤	ʤu:ropɯkusu
⑥	tisɯ	⑥	gu:no	⑥	dju:rapɯrekkɯsɯ
⑦	sisɯ	⑦	gɯ:n	⑦	djɯ:ropɯrekkɯsɯ
⑧	ʃissɯ	⑧	gɯ:n	⑧	djɯ:rapɯrekkɯsɯ
⑨	ɵissɯ	⑨	gu:n	⑨	djɯ:rapɯrekkɯsɯ
⑩	tissɯ	⑩	gɯ:n	⑩	djɯ:rapɯrekkɯsɯ
22	zʌbɜ:b	**23**	tauð	**24**	nlftlk
	zaba:bɯ		taɯzɯ		niɸɯtikkɯ
①	zabɜ:bu	①	tau(d>v)u	①	niftikku
②	zabɜ:bɯ	②	taudʒi	②	nlffɯtikkɯ
③	zabɜ:rɯbɯ	③	taɯvɯ	③	niffɯtikkɯ
④	zabarɯbɯ	④	taɯrɯzɯ	④	nlfɯtikɯ
⑤	zaba:bu	⑤	tæuruvu	⑤	niftikku
⑥	zabɜrbɯ	⑥	tarusu	⑥	nifutikkɯ
⑦	zaba:bɯ	⑦	ta:zu	⑦	nifɯtikkɯ
⑧	zaba:bɯ	⑧	taɯsɯ	⑧	nifɯtikkɯ
⑨	zabarɯbɯ	⑨	taɯ(t>z)ɯ	⑨	nifɯtikki
⑩	zaba:bɯ	⑩	taɯðɯ	⑩	nifɯtikkɯ
25	llu:n	**26**	mjænma:	**27**	pllŋk
	ɪrɯ:ñ		mjamma:		pɯriŋkɯ
①	iru:n	①	mjanma:	①	puriŋku
②	ilu:(no>n)	②	miænma:	②	puriŋku
③	ilu:n	③	mjænma:	③	pɯrlŋkɯ
④	ɪrɯ:n	④	mjænoma:rɯ	④	pɯriŋkɯ
⑤	iru:n	⑤	mjænma:ru	⑤	pliŋku
⑥	iru:nɯn	⑥	miənma:rɯ	⑥	pɯriŋkɯ
⑦	ɪrɯ:n	⑦	miənma:rɯ	⑦	pɯriŋkɯ
⑧	ɪrɯ:n	⑧	mjanma:	⑧	pɯriŋkɯ
⑨	ɪrɯ:nɯ	⑨	mjænma:	⑨	pɯriŋkɯ
⑩	ɪrɯ:n	⑩	mjanma:	⑩	pɯriŋkɯ

28	fu:tl	**29**	vlpə:	**30**	ʧɜ:n
	ɸɯ:toɾɯ		vippa:		ʧa:ñ
①	futturu	①	viǫpa:	①	ʧɜ:n
②	fɯ:toɾɯ	②	viǫpa:	②	ʧa:no
③	fɯ:tiɾɯ	③	viǫpa	③	ʧɜɾɯn
④	fɯ:toɾɯ	④	vipa	④	ʧa:nɯ
⑤	fu:toɾɯ	⑤	vippa:	⑤	ʧiɜnu
⑥	fu:tuɾɯ	⑥	vi:pa:	⑥	ʧa:nɯ
⑦	ɸɯta:ɾɯ	⑦	vippa:	⑦	ʧa:nɯ
⑧	ɸɯ:tɯɾɯ	⑧	bippa:	⑧	ʧa:n
⑨	futoɾɯ	⑨	vipa:	⑨	ʧɜ:n
⑩	ɸɯ:toɾɯ	⑩	vippa:	⑩	ʧɜ:n
31	ʤɛnoUlәf	**32**	plɜ:t	**33**	wum
	ʤeno:raɸɸɯ		pɯra:to		ɯ:mɯ
①	ʤano:ɾeffu	①	puru:to	①	u:mu
②	ʤino:ɾuff	②	pulɜ:do	②	wɯ:m
③	ʤeno:r(u>e)fɯ	③	plɜ:to	③	wɯ:mɯ
④	ʤeno:roffɯ	④	pɯrɜ:to	④	ɯ:mbɯ
⑤	ʤino:ɾɯffu	⑤	ple:to	⑤	wɯ:m
⑥	ʤeno:ɾɯffɯ	⑥	plɜ:do	⑥	wɯ:mɯ
⑦	ʤino:riɸɸɯ	⑦	pɯl(e>a):to	⑦	ɯwɯ:m(oɯ>ɯ)
⑧	ʤino:rəffɯ	⑧	pɯra:do	⑧	ɯ:mɯ
⑨	(g>ʤ)eno:rəffɯ	⑨	pɯraɾɯto	⑨	wɯ:mɯ
⑩	ʤeno:reffɯ	⑩	pɯra:to	⑩	wɯ:mɯ
34	wᵬmpʊt	**35**	tʊp	**36**	ɜ:ni
	ɯompɯtto		tɯppɯ		a:ni:
①	wompʊtto	①	tʊpu	①	ɜ:ni:
②	wompɯtto	②	tɯppɯ	②	ɜ:ni:
③	wompɯtto	③	ʧɯpɯ	③	a:ni:
④	wʌmpɯtto	④	tʊbbɯ	④	ɜ:ni:
⑤	wompʊtto	⑤	tʊppu	⑤	a:ni:
⑥	wompʊtu	⑥	tʊpu	⑥	ɜ:ni:
⑦	ɯomputto	⑦	tsɯpɯ	⑦	e:ni:
⑧	ɯompɯtto	⑧	tsɯppɯ	⑧	a:ni:
⑨	wompɯtto	⑨	tɯppɯ	⑨	ɜ:ni:
⑩	wompɯtto	⑩	tɯppɯ	⑩	a:ni:

37	ɒlivlə	**38**	gəstɛə	**39**	bju:t
	orivia		gɯsɯtea		bjɯ:to
①	orivia	①	gustte:ɾɯ	①	bjɯ:to
②	olivia	②	gesɯttea	②	bjɯ:to
③	orivia	③	geste:	③	biɯ:to
④	orivia	④	gɯsɯte:a	④	bjɯ:to
⑤	orivia	⑤	gista:	⑤	bjɯ:to
⑥	oribia	⑥	gɯsɯtea	⑥	bju:to
⑦	orivia	⑦	gɯisɯtea	⑦	bjɯ:to
⑧	orivia	⑧	gesɯtea	⑧	bjɯ:to
⑨	orivia	⑨	gɯsɯtea	⑨	bjɯ:to
⑩	orivia	⑩	gsɯtea	⑩	bjɯ:to
40	kærəbi:nə	**41**	kælgu:ll	**42**	gæfə
	kjarabi:na		kjarɯgɯ:ri		gjaɸa
①	karabi:na	①	karɯgu:ri	①	gafa
②	karabi:na	②	karɯgɯ:ri	②	gafa
③	karabi:na	③	karɯgɯ:ri	③	gafa
④	kærəbi:na	④	kærɯgɯ:ri:	④	gæfa
⑤	karabi:na	⑤	karɯgɯ:ri:	⑤	gafa
⑥	karabi:na:	⑥	kærɯgɯ:ri:	⑥	gæfa:
⑦	karabi:na	⑦	karɯgɯ:ri	⑦	gaɸa:
⑧	kjarabi:na	⑧	kjarɯgɯ:ri	⑧	gjafa
⑨	karabi:na	⑨	karɯgɯ:ri	⑨	gafa:
⑩	kjarabi:na	⑩	kærɯgɯ:ri	⑩	gjafa:
43	gæðə:	**44**	slɛʃ	**45**	hout
	gjaza:		sɯreʃʃɯ		ho:to
①	gæða:	①	sleʃʃɯ	①	ho:to
②	gaza:	②	sɯleʃʃɯ	②	ho:to
③	gada:	③	sɯlɛʃɯ	③	hɔ:to
④	gæva:	④	sirɛʃʃi	④	ho:tɯ
⑤	gava:	⑤	sleʃʃu	⑤	houto
⑥	gava:	⑥	sɯreʃɯ	⑥	hoato
⑦	gasa:	⑦	sɯreʃi	⑦	ho:to
⑧	gjaza:	⑧	sɯreʃʃi	⑧	ho:to
⑨	gava:	⑨	sɯreʃʃi	⑨	hoʊto
⑩	gjaza:	⑩	sɯreʃʃɯ	⑩	ho:to

46	tɔləbraɪ	**47**	plɔdrlə	**48**	mɛə
	to:rabɯrai		pɯro:doria		mea
①	to:ɬaburai	①	puro:duria	①	me:rɯ
②	to:roburai	②	pɯro:doria	②	mea
③	to:ləburai	③	plo:doria	③	me:
④	to:lebɯrai	④	pɯro:dori:a	④	me:a
⑤	to:rubrai	⑤	plodo:ri:a	⑤	mia:ru
⑥	to:rɯbɯraiɯ	⑥	pɯro:dɯria	⑥	me:a
⑦	to:robɯrai	⑦	pɯro:doria	⑦	mea
⑧	to:robɯrai	⑧	pɯro:doria	⑧	mea
⑨	to:rəbɯrai	⑨	pɯro:doria	⑨	me:rɯ
⑩	to:rabɯrai	⑩	pɯro:doria	⑩	me:

G2 survey responses

01	wɒʃt	**02**	mædl	**03**	strʌg
	ɯoʃʃɯto		madorɯ		sɯtoraggɯ
①	woʃʃuto	①	mædorɯ	①	sɯtoraggɯ
②	woʃɯto	②	madarɯ	②	sɯtoraggɯ
③	woʃuto	③	mædolɯ	③	sɯtoraggɯ
④	ɯoʃɯto	④	madorɯ	④	sɯtoraggɯ
⑤	ɯoʃʃɯto	⑤	mædorɯ	⑤	sɯtora:gɯ
⑥	ɯoʃʃɯtɯ	⑥	maddorɯ	⑥	sɯtoraggɯ
⑦	ɯoʃʃɯto	⑦	madorɯ	⑦	sɯtoraggɯ
⑧	wa:ʃɯto	⑧	mædarɯ	⑧	sɯtɯragɯ
⑨	woʃɯto	⑨	madorɯ	⑨	sɯtoragɯ
⑩	woʃɯto	⑩	madorɯ	⑩	sɯtorago
04	flɜ:d	**05**	blntʃt	**06**	mʌndʒ
	ɸɯra:do		bintʃito		mandʒi
①	fɯra:do	①	bintʃito	①	mandʒi
②	fɯrɜ:do	②	bintʃito	②	mandʒi
③	fɯlɜ:do	③	bintʃito	③	mʌndʒi
④	ɸɯra:do	④	bintʃido	④	mandʒɯ
⑤	fɯlɜ:do	⑤	bintʃito	⑤	mandʒɯ
⑥	fɯrɜ:do	⑥	bintʃido	⑥	mandʒɯ
⑦	fɯra:do	⑦	bintʃito	⑦	mandʒi
⑧	ɸɯra:do	⑧	bintʃɯdə	⑧	mandʒi
⑨	ɸɯra:do	⑨	bintʃito	⑨	mandʒi
⑩	fɯra:do	⑩	bintʃito	⑩	mʌndʒɯ

07	ma:ʤ	**08**	ətrautʃ	**09**	sluə
	ma:ʤi		atoɾawtʃi		sɯrɯa
①	ma:ʤi	①	etoɾawtʃi	①	sɯrɯa
②	ma:ʤi	②	etoɾawtʃi	②	sɯrɯa
③	ma:ʤi	③	atoɾawtʃi	③	slɯ:
④	ma:ʤɯ	④	etoɾawtʃɯ	④	sərɯ:a
⑤	ma:ʤɯ	⑤	etoɾaɾɯ:ʧɯ	⑤	sɯrɯ:a
⑥	ma:ʤɯ	⑥	etrawtʃɯ	⑥	sɯrɯa
⑦	ma:ʤi	⑦	etoɾawttʃi	⑦	sɯrɯa
⑧	ma:ʤi	⑧	atrawtʃɯ	⑧	sɯrɯa
⑨	mʌ:ʤi	⑨	etoɾawtʃi	⑨	sɯrɯa:
⑩	mʌ:ʤɯ	⑩	atrawtʃɯ	⑩	sɯrɯa
10	dɛlvz	**11**	dɛfrel	**12**	ji:ld
	deɾɯ(v/b) ɯzɯ		deɸɯre(:/i)		i:ɾɯdo
①	deɾɯvɯzɯ	①	defɯrei	①	ji:ɾɯdo
②	deɾɯ(b>v)ɯzɯ	②	dəfɯrei	②	i:ɾɯdo
③	delvɯzɯ	③	difɯrei	③	ji:ɾɯdo
④	deɾɯvɯzɯ	④	deɸɯrei	④	ji:ɾɯdo
⑤	deɾɯvɯzɯ	⑤	deɸɯrei	⑤	i:ɾɯdɯ
⑥	deɾɯvɯ	⑥	deɸɯrei	⑥	ji:ɾɯdo
⑦	deɾɯvɯsɯ	⑦	deɸɯrei	⑦	ji:ɾɯdo
⑧	deɾɯvɯzɯ	⑧	defɯrei	⑧	ji:ɾɯd(ɯ>o)
⑨	deɾɯvɯzɯ	⑨	deɸɯrei	⑨	i:ɾɯdo
⑩	deɾɯvɯzɯ	⑩	di:ɸɯrei	⑩	ji:ɾɯdo
13	bltmæp	**14**	tldÞks	**15**	zʌʧ
	bittomappɯ		tidokkɯsɯ		zattʃi
①	bittomæppɯ	①	tidokkɯsɯ	①	zattʃi
②	bittomappɯ	②	ʧidokkɯsɯ	②	zattʃi
③	bitomappɯ	③	tidokkɯsɯ	③	zattʃi
④	bittomæppɯ	④	tidokkɯsɯ	④	za:ʧi
⑤	bittomappɯ	⑤	tedokkɯsɯ	⑤	zatʤi
⑥	bittomappɯ	⑥	ʧidokkɯsɯ	⑥	zattʃi
⑦	bittomappɯ	⑦	tidokkɯsɯ	⑦	zattʃi
⑧	bitomapɯ	⑧	tidokkɯsɯ	⑧	zattʃi
⑨	bittomappɯ	⑨	tidokɯsɯ	⑨	za:ʧi
⑩	bittomappɯ	⑩	tsidokɯsɯ	⑩	za:ʧi

16	græʃ	**17**	kʊmba:	**18**	pju:gi:
	gɯraʃʃɯ		kɯmba:		pjɯ:gi:
①	gɯræʃʃɯ	①	kɯmba:	①	pjɯ:gi:
②	gɯraʃɯ	②	kɯmba:	②	pjɯ:gi:
③	græʃu	③	kɯmba:	③	pjɯ:gi:
④	gɯraʃʃɯ	④	kɯmba:	④	pejɯ:gi:
⑤	gɯræʃʃɯ	⑤	kɯmba:	⑤	pjɯ:gi:
⑥	gɯræʃʃɯ	⑥	kɯmba:	⑥	pjɯ:gi:
⑦	gɯraʃʃɯ	⑦	kɯmba:	⑦	piɯ:gi:
⑧	gɯraʃʃɯ	⑧	kɯmba:	⑧	pɯjɯ:gi:
⑨	gɯraʃʃɯ	⑨	kɯmba:	⑨	pjɯ:gi:
⑩	gɯraʃʃɯ	⑩	kɯmba:	⑩	pjɯ:gi:
19	ɵls	**20**	gu:n	**21**	djurʌplɛks
	(ʃ/s)isɯ		gɯ:ñ		djɯ:rapɯrekkɯsɯ
①	hisɯ	①	gɯ:n	①	ʤɯ:rapɯrekkɯsɯ
②	ʃiɋsɯ	②	gɯ:n	②	djɯ:rapɯrekkɯsɯ
③	tisu	③	gɯ:n	③	ʤɯ:rapurekkɯsɯ
④	zissɯ	④	gɯ:n	④	ʤɯ:rapɯrekkɯsɯ
⑤	ʃisɯ	⑤	gɯ:n	⑤	ʤɯ:ropɯrekkɯsɯ
⑥	sɯrisɯ	⑥	gɯ:n	⑥	dijɯ:ropɯrekkɯsɯ
⑦	(f>ʃ)isɯ	⑦	gɯ:n	⑦	dijɯ:ropɯrekkɯsɯ
⑧	te:sɯ	⑧	gɯ:n	⑧	dɯrɯ:ropɯrekɯsɯ
⑨	(f>ʃ)isɯ	⑨	gɯ:n	⑨	ʤɯ:rapɯrekɯsɯ
⑩	fisɯ	⑩	gɯ:n	⑩	ʤɯ:ropɯrekɯsɯ
22	zʌbɜ:b	**23**	tauð	**24**	nlftlk
	zaba:bɯ		taɯzɯ		niɸɯtikkɯ
①	zaba:bɯ	①	taɯvɯ	①	nifɯtikkɯ
②	zaba:bɯ	②	taɯðɯ	②	nifɯtikkɯ
③	zabɜ:bu	③	taozɯ	③	nifɯtikku
④	zaba:bɯ	④	taɯzɯ	④	niɸɯtikkɯ
⑤	zaba:bɯ	⑤	taruvɯ	⑤	nifɯtikkɯ
⑥	zabɜ:bɯ	⑥	taɯzɯ	⑥	nifɯtikkɯ
⑦	zaba:bɯ	⑦	taɯzɯ	⑦	nifɯtikkɯ
⑧	zabɜ:bɯ	⑧	taɯzɯ	⑧	niɸɯtikkɯ
⑨	zaba:bɯ	⑨	taɯzɯ	⑨	nifɯtikkɯ
⑩	zabɜ:bo	⑩	taɯzɯ	⑩	nifɯtikkɯ

25	llu:n	**26**	mjænma:	**27**	pllŋk
	ɪrɯ:ñ		mjamma:		pɯrɪŋkɯ
①	ilɯ:n	①	mjanma:	①	pɯliŋkɯ
②	ilɯ:n	②	mijanma:	②	pɯrɪŋkɯ
③	ilɯ:n	③	mjanma:	③	pɯrɪŋku
④	ɪrɯ:n	④	mjamma:	④	pɯrɪŋkɯ
⑤	ilɯ:n	⑤	mianɯma:	⑤	pɯrɪŋkɯ
⑥	ilɯ:n	⑥	mianma:	⑥	pɯrɪŋkɯ
⑦	ɪrɯ:n	⑦	mjanma:	⑦	pɯrɪŋkɯ
⑧	ilɯ:n	⑧	mianma:ɾɯ	⑧	pɯrɪŋkɯ
⑨	ɪru:n	⑨	mjanma:ɾɯ	⑨	pɯrɪŋkɯ
⑩	ɪrɯ:nɯ	⑩	mjanma:	⑩	pɯrɪŋko
28	fu:tl	**29**	vlpə:	**30**	ʧɜ:n
	ɸɯ:toɾɯ		vippa:		ʧa:ñ
①	fɯ:toɾɯ	①	(v>b)ippa:	①	ʧa:n
②	fɯ:toɾɯ	②	(b>v)ippa:	②	ʧa:n
③	fɯ:tlɯ	③	bipa:	③	ʧɜ:n
④	ɸɯ:toɾɯ	④	vippa:	④	ʧia:n
⑤	ɸɯ:toɾɯ	⑤	vippa:	⑤	ʧɜ:nɯ
⑥	fɯ:tɯɾɯ	⑥	vipa:	⑥	ʧiɜ:n
⑦	ɸɯ:taɾɯ	⑦	vipa:	⑦	ʧa:n
⑧	fɯ:taɾɯ	⑧	bippa	⑧	ʧa:n(ɯ> nil)
⑨	ɸɯ:toɾɯ	⑨	vipa:	⑨	ʧa:n
⑩	fɯ:tɯɾɯ	⑩	vippa:	⑩	ʧa:no
31	ʤɛnoUlәf	**32**	plɜ:t	**33**	wum
	ʤeno: ɾaɸɸɯ		pɯra:to		ɯ:mɯ
①	ʤeno:reffɯ	①	pɯra:to	①	wɯ:mɯ
②	ʤeno:reffɯ	②	pɯra:to	②	ɯ:mɯ
③	ʤəno:refɯ	③	plɜ:to	③	ɯ:mɯ
④	ʤeno:rivɯ	④	pɯlɜ:do	④	wɯ:mɯ
⑤	ʤeno:rɯɸɸɯ	⑤	pɯlɜ:do	⑤	ɯ:mɯ
⑥	ʤeno:ri:fɯɾɯ	⑥	pɯrɜ:to	⑥	ɯrɯ:mɯ
⑦	ʤino:riɸɸɯ	⑦	pɯra:to	⑦	wɯ:mɯ
⑧	ʤenero:lɯɸɸɯ	⑧	pɯrɜ:tɯ	⑧	wɯ:mɯ
⑨	ʤeno:reɸɯ	⑨	pɯra:to	⑨	ɯ:mɯ
⑩	ʤeno:rɯɸɯ	⑩	pɯrɜ:to	⑩	wɯ:mɯ

34	wɒmpʊt	**35**	tʊp	**36**	ɜ:ni
	ɯompɯtto		tɯppɯ		a:ni:
①	wompɯtto	①	tɯppɯ	①	a:ni:
②	wompɯtto	②	tɯppɯ	②	a:ni:
③	wompɯtto	③	tɯpɯ	③	a:ni:
④	wompɯtto	④	tʊppɯ	④	ɜ:ni:
⑤	ɯompɯtto	⑤	tsɯpɯ	⑤	a:ni:
⑥	ɯompɯtto	⑥	tɯppɯ	⑥	a:ni:
⑦	ɯompɯtto	⑦	tɯppɯ	⑦	ɜ:ni:
⑧	wompɯtto	⑧	tɯppɯ	⑧	ɜ:ni:
⑨	wompɯtto	⑨	ʧɯpɯ	⑨	a:ni:
⑩	wompʊtto	⑩	tsɯpɯ	⑩	a:ni:
37	ɒllvlə	**38**	gəstɛə	**39**	bju:t
	orivia		gɯsɯtea		bjɯ:to
①	orivia	①	gesɯtea	①	bjɯ:to
②	orivia	②	gasɯtea	②	bjɯ:to
③	orivia	③	gasɯte:	③	bjɯ:to
④	orivia	④	gesɯte:ɾɯ	④	bjɯ:to
⑤	orivia	⑤	gesɯtea	⑤	bjɯ:to
⑥	orivia	⑥	gɪsɯtea	⑥	bjɯ:to
⑦	orivia	⑦	gisɯtea	⑦	bjɯ:to
⑧	orivia	⑧	gesɯtea	⑧	bjɯ:to
⑨	olivia	⑨	gesɯtea	⑨	bjɯ:to
⑩	orivia	⑩	gesɯtea	⑩	bjɯ:to
40	kærəbi:nə	**41**	kælgu:ll	**42**	gæfə
	kjarabi:na		kjarɯgɯ:ɾi		gjaɸa
①	kærabi:na:	①	kærɯgɯ:ɾi	①	gæfa
②	kærabi:na	②	kærɯgɯ:ɾi	②	gæfa
③	kjarabi:na	③	kjarɯgɯ:ɾi	③	gjaɸa
④	kjarabi:na	④	kjarɯgɯ:ɾi	④	gjafa
⑤	kærabi:na	⑤	karɯgɯ:ɾi	⑤	gafa
⑥	karabi:na	⑥	karɯgɯ:ɾi	⑥	gaɸa
⑦	kærabi:na	⑦	kærɯgɯ:ɾi	⑦	gæfa
⑧	kærabi:na	⑧	kærɯgɯ:ɾi	⑧	gæfa
⑨	karabi:na	⑨	karɯgɯ:ɾi	⑨	gafa
⑩	karabi:na	⑩	karɯgɯ:ɾi	⑩	gaɸa

43	gæðə:	44	slɛʃ	45	hout
	gjaza:		sɯreʃʃɯ		ho:to
①	gæza:	①	sɯreʃʃɯ	①	ho:to
②	gæva:	②	sɯreʃɯ	②	ho:to
③	gjaza:	③	sɯreʃʃɯ	③	ho:to
④	gjaza:	④	sɯreʃʃɯ	④	houto
⑤	gaza:	⑤	sɯreʃʃɯ	⑤	ho:to
⑥	gaza:	⑥	sɯreʃʃɯ	⑥	ho:to
⑦	gæza:	⑦	sɯreʃʃɯ	⑦	ho:to
⑧	gæða:	⑧	sɯreʃʃɯ	⑧	ho:to
⑨	gaza:	⑨	sɯreʃɯ	⑨	ho:to
⑩	gaza:	⑩	sɯreʃʃɯ	⑩	ho:to
46	tɔləbral	**47**	plɔdrlə	**48**	mɛə
	to:ɾabɯrai		pɯro:doria		mea
①	to:labɯrai	①	pɯro:doria	①	mea
②	to:ɾabɯrai	②	pɯro:doria	②	mea
③	to:abɯrai	③	paro:dria	③	me:
④	to:ɾabɯra:i	④	pɯro:dori:ɾɯ	④	me:ɾɯ
⑤	to:ɾobɯrai	⑤	pɯro:doria	⑤	me:ɾɯ
⑥	to:ɾabɯrai	⑥	pɯro:doria	⑥	mea
⑦	to:ɾabɯrai	⑦	pɯro:doria	⑦	mea
⑧	to:ɾebɯrai	⑧	pɯro:doria	⑧	mea
⑨	to:ɾebɯrai	⑨	pɯra:doria	⑨	merɯ
⑩	to:ɾebɯrai	⑩	pɯro:dria	⑩	me:

G3 survey responses

01	wɒʃt	02	mædl	03	strʌg
	ɯoʃʃɯto		madoɾɯ		sɯtoraggɯ
①	ɯoʃʃɯto	①	madoɾɯ	①	sɯtoraggɯ
②	ɯoʃʃɯto	②	mædəɾɯ	②	sɯtoraggɯ
③	ɯoʃʃɯto	③	madoɾɯ	③	sɯtoraggɯ
④	ɯoʃʃɯto	④	madoɾɯ	④	sɯtoraggɯ
⑤	ɯoʃɯto	⑤	madoɾɯ	⑤	sɯtoɾa:gɯ
⑥	ɯoʃʃito	⑥	mædʌɾɯ	⑥	sɯtoraggɯ
⑦	ɯoʃʃɯtɯ	⑦	mædoɾɯ	⑦	sɯtoragɯ
⑧	ɯoʃʃɯto	⑧	mædɯɾɯ	⑧	sɯtoraggɯ
⑨	ɯoʃɯto	⑨	maddoɾɯ	⑨	sɯtoraggɯ
⑩	woʃɯto	⑩	maddoɾɯ	⑩	sɯtoraggɯ

04	flɜ:d	**05**	blntʃt	**06**	mʌndʒ
	ɸɯra:do		bintʃito		mandʒi
①	fɯre:do	①	bintʃɯdo	①	mandʒɯ
②	fɯru:do	②	bintʃito	②	mandʒi
③	fɯra:do	③	bintʃito	③	mandʒi
④	fɯra:do	④	bintʃito	④	mandʒi
⑤	ɸɯrɜ:do	⑤	bintʃɯto	⑤	mandʒɯ
⑥	ɸɯra:do	⑥	bintʃlto	⑥	mandʒi
⑦	ɸɯrɜ:do	⑦	bintʃɯto	⑦	mandʒɯ
⑧	ɸɯra:do	⑧	bintʃito	⑧	mʌndʒɯ
⑨	fɯra:do	⑨	bintʃito	⑨	mandʒi
⑩	ɸɯre:do	⑩	bintʃɯto	⑩	mandʒɯ
07	ma:dʒ	**08**	ətrautʃ	**09**	sluə
	ma:dʒi		atorawtʃi		sɯrɯa
①	ma:dʒi	①	etorawtʃɯ	①	sorɯa
②	ma:dʒi	②	etorawtʃi	②	sɯrɯa:
③	ma:dʒi	③	atorawtʃi	③	sɯrɯa
④	ma:dʒi	④	atorawtʃi	④	sɯrɯa
⑤	ma:dʒ(i>ɯ)	⑤	atorawtʃi	⑤	sɯrɯa
⑥	ma:dʒi	⑥	etrawtʃi	⑥	sɯlɯa:
⑦	ma:dʒɯ	⑦	etrawtʃi	⑦	sɯrɯa
⑧	marɯdʒɯ	⑧	etorawtʃi	⑧	sɯrɯa
⑨	ma:dʒi	⑨	etorawtʃɯ	⑨	sɯrɯ:a
⑩	ma:dʒi	⑩	etorawdʒi	⑩	sɯrɯa:
10	dɛlvz	**11**	dɛfrel	**12**	ji:ld
	derɯ(v/b) ɯzɯ		deɸɯre(:/i)		i:rɯdo
①	derɯbɯ(z>s)ɯ	①	defɯrei	①	i:rɯdo
②	derɯvɯzɯ	②	defɯrei	②	i:rɯdo
③	derɯvɯzɯ	③	defɯre(:>i)	③	i:rɯdo
④	derɯvɯzɯ	④	deɸɯrei	④	i:rɯdo
⑤	derɯvɯzɯ	⑤	deɸɯre:	⑤	i:rɯdo
⑥	derɯvɯzɯ	⑥	deɸɯrei	⑥	i:rɯdo
⑦	derɯvɯzɯ	⑦	depɯrei	⑦	ji:rɯdo
⑧	derɯvɯzɯ	⑧	deɸɯrei	⑧	ji:rɯdo
⑨	derɯbɯsɯ	⑨	deɸɯrei	⑨	ji:rɯdo
⑩	derɯvɯsɯ	⑩	deɸɯre:	⑩	ji:rɯdo

13	bɪtmæp	**14**	tɪdÞks	**15**	zʌtʃ
	Bittomappɯ		tidokkɯsɯ		zattʃi
①	bittomappɯ	①	tidokɯsɯ	①	zattʃi
②	bittomæppɯ	②	tʃidokkɯsɯ	②	zattʃi
③	bittomappɯ	③	tidokkɯsɯ	③	zattʃi
④	bittomappɯ	④	tidokkɯsɯ	④	zattʃi
⑤	bittomappɯ	⑤	tedokkɯsɯ	⑤	zattʃi
⑥	bittomappɯ	⑥	tidokkɯsɯ	⑥	zattʃi
⑦	bittomappɯ	⑦	tidokɯsɯ	⑦	zattʃi
⑧	bittomappɯ	⑧	tidokɯsɯ	⑧	zattʃɯ
⑨	bittomappɯ	⑨	tidokkɯsɯ	⑨	zattʃi
⑩	bittomappɯ	⑩	tʃidokkɯsɯ	⑩	zattʃi
16	græʃ	**17**	kʊmba:	**18**	pju:gi:
	gɯraʃʃɯ		kɯmba:		pjɯ:gi:
①	gɯraʃʃɯ	①	kɯmba:	①	p(i>j)ɯ:gi:
②	gɯræʃʃɯ	②	kɯmba:	②	pjɯ:gi:
③	gɯraʃʃɯ	③	kɯmba:	③	pjɯ:gi:
④	gɯraʃʃɯ	④	kɯmba:	④	pjɯ:gi:
⑤	gɯraʃʃɯ	⑤	kɯmba:	⑤	pjɯ:gi:
⑥	gɯræʃʃi	⑥	kɯmba:	⑥	pjɯ:gi:
⑦	gɯræʃʃɯ	⑦	kɯmba	⑦	pjɯ:gi:
⑧	gɯræʃʃɯ	⑧	kɯmba:	⑧	pjɯ:gi:
⑨	gɯræʃʃɯ	⑨	kɯmba:	⑨	pjɯ:gi:
⑩	gɯraʃʃɯ	⑩	kɯmba:	⑩	pjɯ:gi:
19	ɵls	**20**	gu:n	**21**	djurʌplɛks
	(ʃ/s)issɯ		gɯ:ñ		djɯ:rapɯrekkɯsɯ
①	ʃissɯ	①	gɯ:n	①	(dj>ʤ)ɯ:rapɯrekkɯsɯ
②	Fissɯ	②	gɯ:n	②	dejɯopɯrekkɯsɯ
③	ʃissɯ	③	gɯ:n	③	ʤɯ:rapɯrekkɯsɯ
④	ʃisɯ	④	gɯ:n	④	djɯ:rapɯrekkɯsɯ
⑤	(f>fɯ)issɯ	⑤	gɯ:n	⑤	ʤɯ:rapɯrekɯsɯ
⑥	ʃissɯ	⑥	gɯ:n	⑥	ʤɯ:rapɯrekkɯsɯ
⑦	sissɯ	⑦	gɯ:n	⑦	ʤɯ:ropɯrekɯsɯ
⑧	ʃissɯ	⑧	gɯ:n	⑧	ʤɯ:rapɯrekkɯsɯ
⑨	ʃissɯ	⑨	gɯ:n	⑨	ʤɯ:rapɯrekkɯsɯ
⑩	(tʃ>ʃ)issɯ	⑩	gɯ:n	⑩	ʤɯ:ropɯrekkɯsɯ

22	zʌbɜ:b	**23**	tauð	**24**	nIftIk
	zaba:bɯ		taɯzɯ		niɸɯtikkɯ
①	zaba:bɯ	①	taɯzɯ	①	nifɯtikkɯ
②	zaba:bɯ	②	taɯzɯ	②	nifɯtikkɯ
③	zaba:bɯ	③	taɯ(ɾɯ)zɯ	③	nifɯtikkɯ
④	zaba:bɯ	④	taɯzɯ	④	nifɯtikkɯ
⑤	zabe:bɯ	⑤	taɯzɯ	⑤	niɸɯtikkɯ
⑥	zʌba:bɯ	⑥	taɯzɯ	⑥	niɸɯʧikkɯ
⑦	zabɜ:bɯ	⑦	taɯɾɯzɯ	⑦	nifɯtikkɯ
⑧	zaba:bɯ	⑧	taɾɯzɯ	⑧	niɸɸɯtikkɯ
⑨	zaba:bɯ	⑨	taɯzɯ	⑨	niɸɯtikɯ
⑩	zaba:bɯ	⑩	taɯzɯ	⑩	niɸɯtikkɯ
25	llu:n	**26**	mjænma:	**27**	pllŋk
	iɾɯ:ñ		mjamma:		pɯɾiŋkɯ
①	iɾɯ:n	①	m(i>j)amma:	①	pɯɾiŋko
②	iɾɯ:n	②	mjamma:ɾɯ	②	pɯɾiŋkɯ
③	iɾɯ:n	③	mjamma:	③	pɯɾiŋkɯ
④	iɾɯ:n	④	mjamma:	④	pɯɾiŋkɯ
⑤	iɾɯ:n	⑤	mj(a>ə)mma:	⑤	pɯɾiŋkɯ
⑥	iɾɯ:n	⑥	mianma:	⑥	pɯɾiŋkɯ
⑦	iɾɯ:n	⑦	mjanma:	⑦	pɯɾiŋkɯ
⑧	iɾɯ:n	⑧	mjanma:	⑧	pɯɾiŋkɯ
⑨	iɾɯ:n	⑨	mjamma:	⑨	pɯɾiŋko
⑩	iɾɯ:no	⑩	mjanma:	⑩	pɯɾiŋkɯ
28	fu:tl	**29**	vlpə:	**30**	ʧɜ:n
	ɸɯ:toɾɯ		vippa:		ʧa:ñ
①	fɯ:tiɾɯ	①	bippa	①	ʧa:n
②	fɯ:tiɾɯ	②	(b>v)ippa	②	ʧa:n
③	fɯ:toɾɯ	③	vippa	③	ʧa:n
④	ɸɯ:toɾɯ	④	vippa:	④	ʧa:n
⑤	ɸɯ:toɾɯ	⑤	vippa:	⑤	ʧɜ:n
⑥	ɸɯ:ʧiɾɯ	⑥	vipa:	⑥	ʧa:n
⑦	fɯ:toɾɯ	⑦	vippa:	⑦	ʧa:n
⑧	ɸɯ:toɾɯ	⑧	vippa	⑧	ʧa:n
⑨	ɸɯ:toɾɯ	⑨	bippa:	⑨	ʧa:n
⑩	ɸɯ:toɾɯ	⑩	vippa:	⑩	ʧa:n

31	ʤɛnoUləf	**32**	plɜ:t	**33**	wum
	ʤeno:raɸɸɯ		pɯra:to		ɯ:mɯ
①	ʤeno:ɾiffɯ	①	pɯrɜ:to	①	ɯ:mɯ
②	ʤenoɾɯffɯ	②	pɯrɜ:to	②	ɯ:mɯ
③	ʤeno:rəffɯ	③	pɯra:to	③	ɯ:mɯ
④	ʤeno:reɸɯ	④	pɯra:to	④	ɯ:mɯ
⑤	ʤeno:ɾɯɸɯ	⑤	pɯrɜ:to	⑤	ɯ:mɯ
⑥	ʤeno:ɾɯɸɸɯ	⑥	plɯ:to	⑥	ɯ:mɯ
⑦	geno:ɾɯfɯ	⑦	pɯrɜ:tɯ	⑦	ɯomɯ
⑧	ʤeno:reɸɸɯ	⑧	pɯrɜ:to	⑧	ɯ:mɯ
⑨	ʤeno:ɾɯɸɸɯ	⑨	pɯra:do	⑨	wɯ:mɯ
⑩	ʤenoɾɯɸɯ	⑩	pɯre:to	⑩	wɯ:mɯ
34	wÞmpʊt	**35**	tʊp	**36**	ɜ:ni
	ɯompɯtto		tɯppɯ		a:ni:
①	ɯompɯtto	①	tsɯppɯ	①	a:ni:
②	ɯompɯtto	②	tsɯppɯ	②	a:ni:
③	ɯompɯtto	③	tɯppɯ	③	ɜ:ni:
④	ɯompɯtto	④	tɯpɯ	④	ɜ:ni:
⑤	ɯompɯtto	⑤	tɯpɯ	⑤	a:ni:
⑥	ɯompɯtto	⑥	ʧɯppɯ	⑥	a:ni:
⑦	ɯonpɯtto	⑦	tɯppɯ	⑦	a:ni:
⑧	wompɯtto	⑧	tɯppɯ	⑧	a:ni:
⑨	wompɯtto	⑨	tɯppɯ	⑨	a:ni:
⑩	wampɯtto	⑩	ʧɯppɯ	⑩	a:ni:
37	Þilvlə	**38**	gəstɛə	**39**	bju:t
	orivia		gɯsɯtea		bjɯ:to
①	orivia	①	gesɯte:	①	bjɯ:to
②	orivia	②	gesɯtea	②	bjɯ:to
③	orivia	③	gesɯtea	③	bjɯ:to
④	orivia	④	gasɯtea	④	bjɯ:to
⑤	orivia	⑤	gɯsɯtea	⑤	bjɯ:to
⑥	orivia	⑥	gɯsɯtea	⑥	bjɯ:to
⑦	orivia	⑦	gɯsɯte:ɾɯ	⑦	bjɯ:to
⑧	orivia	⑧	gesɯtea	⑧	bjɯ:to
⑨	orivia	⑨	gesɯtea	⑨	bjɯ:to
⑩	orivia	⑩	gɯsɯtea	⑩	bjɯ:to

40	kærəbi:nə	**41**	kælgu:ll	**42**	gæfə
	kjarabi:na		kjarɯgɯ:ɾi		gjaɸa
①	karabi:na	①	karɯgɯ:ɾi	①	gafa
②	kjarabi:na	②	kjarɯgɯ:ɾi	②	gjaɸa
③	kærabi:na	③	karɯgɯ:ɾi	③	gafa
④	karabi:na	④	karɯgɯ:ɾi	④	gafa
⑤	karabi:na	⑤	karɯgɯ:ɾi	⑤	gaɸa
⑥	karabi:na	⑥	karɯgɯ:ɾi	⑥	gafa
⑦	karabi:na	⑦	karɯgɯ:ɾi	⑦	gaɸa
⑧	kjarabi:na	⑧	kjarɯgɯ:ɾi	⑧	gjaɸa
⑨	karabi:na	⑨	karɯgɯ:ɾi	⑨	gaɸa
⑩	karabi:na	⑩	karɯgɯ:ɾi	⑩	gaɸa
43	gæəə:	**44**	slɛʃ	**45**	hout
	gjaza:		sɯreʃʃɯ		ho:to
①	gaza:	①	sɯreʃʃɯ	①	ho:to
②	gjaza:	②	sɯre:ʃɯ	②	ho:to
③	gæza:	③	sɯreʃʃɯ	③	ho:to
④	gaza:	④	sɯreʃʃɯ	④	ho:to
⑤	gaza:	⑤	sɯreʃʃɯ	⑤	ho:to
⑥	gaza:	⑥	sɯreʃʃi	⑥	hou:to
⑦	gaza:	⑦	sɯreʃʃɯ	⑦	ho:to
⑧	gjaza:	⑧	sɯreʃʃɯ	⑧	ho:to
⑨	gaza:	⑨	sɯreʃʃɯ	⑨	ho:to
⑩	gaza:	⑩	sɯreʃʃɯ	⑩	howto
46	tɔləbral	**47**	plɔdrlə	**48**	mɛə
	to:rabɯrai		pɯro:doria		mea
①	to:rabɯrai	①	pɯro:doria	①	me:
②	to:rebɯrai	②	pɯro:doria	②	mea
③	to:rebɯrai	③	pɯro:doria	③	mea
④	to:rebɯrai	④	pɯro:doria	④	mea
⑤	to:rabɯrai	⑤	pɯro:doria	⑤	mea
⑥	to:rebɯrai	⑥	pɯro:doria	⑥	mea
⑦	to:robɯrai	⑦	pɯro:dria	⑦	me:
⑧	to:ɾɯbɯrai	⑧	pɯro:doria	⑧	me:ɾɯ
⑨	to:lobɯrai	⑨	pɯro:doria	⑨	mea
⑩	to:robɯrai	⑩	pɯro:doria	⑩	me:

Appendix 6: Production Tallies

Within each box, 'G1, G2 and G3' refer to subject Group 1, Group 2 and Group 3. Circled numbers (①, ②,..) refer to subjects 1, 2, and so on in each group. Uncircled numbers (01, 02,..) refer to the word item tested.

1. Open Syllabication

(1) Responses for items corresponding to t/d insert targets ([o] insert)

01	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	02	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	03	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	04	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
G1	O	O	△ J	△ J	△ J	△ J	O	O	O	O	G1	△ J	O	△ E	O	O	-	O	O	O	O	G1	-	-	O	O	-	-	O	O	O	O	G1	△ J	O	△ J	△ J	O	△ J	O	-	O	△ J
G2	O	O	O	O	O	△ J	O	O	O	O	G2	O	△ E	O	O	O	O	O	△ E	O	O	G2	O	O	O	O	O	O	O	O	O	O	G2	O	O	O	O	O	O	O	O	O	O
G3	O	O	O	O	O	O	△ J	O	O	O	G3	O	△ E	O	O	O	△ E	O	△ J	O	O	G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	△ J	O	O	O

Row 1: "O"=correct, "△"=hyper-correction (J=J wrong winner, E=AE, ?=other), "X"=incorrect, "-"=absent

(2) Responses for items corresponding to tʃ/dʒ insert targets ([i] insert)

05	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	06	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	07	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	08	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
G1	O	△ ?	O	O	△ J	△ J	O	O	O	O	G1	O c	O i	O c	O c	O i	O i	O c	O c	O c	O c	G1	△ J	O c	O c	O c	△ J	O c	O c	O c	O c	O c	G1	O	O	△ J	△ J	△ J	△ J	O	△ J	O	-
G2	O	O	O	O	O	O	O	△ J	O	O	G2	O c	O c	O c	O i	O i	O i	O c	O c	O c	O i	G2	O c	O c	O c	O i	O c	O c	O c	O c	O c	O i	G2	O	O	O	△ J	△ J	△ J	O	△ J	O	△ J
G3	△ J	O	O	O	△ J	O	△ J	O	O	△ J	G3	O i	O c	O i	O c	O i	O c	O i	O i	O c	O i	G3	O c	O c	O c	O c	O c/i	O i	O i	O i	O c	O c	G3	△ J	O	O	O	O	O	O	O	△ J	O

(3) Responses for all other items ([ɯ] insert)

01	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	02	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	03	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	04	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
G1	O	O	O	O	-	O	O	O	O	O	G1	O	O	O	-	O	O	△ J	O	O	O	G1	O	O	O	O	O	O	O	O	O	O	G1	O	O	O	O	O	-	O	O	O	O
G2	O	O	-	△ ?	O	O	O	O	O	O	G2	O	O	-	O	O	O	O	O	O	O	G2	O	O	O	O	O	O	O	O	O	O	G2	O	O	O	O	O	O	O	O	O	O
G3	△ J	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O

2. Germinate Formation

13	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	14	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	15	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	16	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
G1	-	O	-	O	O	O	O	O	O	O	G1	O	O	O	O	O	-	-	O	-	O	G1	O	O	-	O	-	O	-	O	O	O	G1	O	O	-	O	O	O	-	O	O	O
G2	O	O	-	O	O	O	O	-	O	O	G2	O	O	O	O	O	O	O	O	-	-	G2	O	O	O	-	O	O	O	O	-	-	G2	O	-	-	O	O	O	O	O	O	O
G3	O	O	O	O	O	O	O	O	O	O	G3	-	O	O	O	O	O	-	-	O	O	G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O

"O"=correct, "-"=absent

04	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	08	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	24	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	38	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
G1	△	O	O	O	O	O	O	O	O	O	G1	O	O	O	O	O	O	O	O	O	O	G1	O	△	△	O	O	O	O	O	O	O	G1	O	△	O	O	O	O	O	O	O
G2	O	O	O	O	O	O	O	O	O	O	G2	O	O	O	O	O	O	△	O	O	O	G2	O	O	O	O	O	O	O	O	O	O	G2	O	O	O	O	O	O	O	O	O
G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	O	△	O	O	G3	O	O	O	O	O	O	O	O	O

"O"=correct, "△"=hypercorrection

3. Vowel Naturalisation

(1) Vowels corresponding to J/i/

12	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	14	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	18	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	19	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
G1	O	△ E	O =	△ E	O	O	O	O	O	O	G1	O	△ E	O	△ E	O	O	O	O	O	O	G1	O	△ E	△ E	△ E	O	△ E	O	O	O	O	G1	O	△ E	△ E	△ E	O	O	△ E	O	O	O
G2	O	O	O	O	O	O	O	O	O	O	G2	O	O	O	O	O	O	O	O	O	O	G2	O	O	O	O	O	O	O	O	O	O	G2	O	O	O	O	O	O	O	X +	O	O
G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	X	O	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O

Row 1: "O"=correct phoneme/allophone naturalisation, "△"=correct phoneme/incorrect allophone naturalisation (E=AE, ?=other), "X"=incorrect, "-"=not present

Row 2: "+"=incorrectly long, "-- "=incorrectly short, "X"=incomplete/absent

(2) Vowels corresponding to J/e/

10	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	11	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	21	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	44	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
G1	O	△ E	△ E	△ E	O	△ E	O	O	O	O	G1	O	△ E	O	△ E	X	X +	△ E	O	O	X	G1	O	△ E	△ E	△ E	X X	O	O	O	O	O	G1	O	O	△ E	△ E	O	O	O	O	O	O
G2	O	O	O	O	O	O	O	O	O	O	G2	O	△ E	X	O	O	O	O	O	O	X +	G2	O	O	O	O	O	O	O	O	O	O	G2	O	O	O	O	O	O	O	O	O	O
G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O	G3	O	O +	O	O	O	O	O	O	O	O

Row 1: "O"=correct phoneme/allophone naturalisation, "△"=correct phoneme/incorrect allophone naturalisation (E=AE, ?=other), "X"=incorrect, "-"=not present

Row 2: "+"=incorrectly long, "-- "=incorrectly short, "X"=incomplete/absent

(3) Central vowels

04	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	08	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	22	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	31	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
G1	X	X	X	X	X	X	X	O	X	O	G1	X	X	X	X	X	X	O	X	X	X	G1	X	X	X	O	O	X	O	O	O	O	G1	X	X	O	O	X	O	X	X	O	O
	=																		+										=			=										
G2	O	X	X	O	X	X	O	O	O	O	G2	X	X	O	X	X	X	X	O	X	O	G2	O	O	X	O	O	X	O	X	O	X	G2	O	O	X	O	O	O	X	O	O	O
G3	X	X	O	O	X	O	X	O	O	X	G3	X	X	O	O	O	X	X	X	X	X	G3	O	O	O	O	X	O	X	O	O	O	G3	O	O	O	O	O	O	O	O	O	O

(4) Vowels corresponding to J/a/

07	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	13	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	22	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	26	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
G1	O	O	O	O	△E	O	O	O	O	O	G1	△E	△E	△E	O	O	△E	△E	O	O	O	G1	O	O	O	O	O	O	O	O	O	O	G1	O	△E	△E	△E	△E	X	X	O	△E	O
					=																																							
G2	O	O	O	O	O	O	O	O	△E	△E	G2	△E	O	O	△E	O	O	O	O	O	O	G2	O	O	O	O	O	O	O	O	O	O	G2	O	O	O	O	O	O	O	O	O	O
G3	O	O	O	O	O	O	O	O	O	O	G3	O	△E	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	△E	O	O	O	O	G3	O	O	O	O	X	O	O	O	O	O
								=																																			

(5) Vowels corresponding to J/u/

18	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	21	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	34	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	35	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
G1	O	△E	O	O	△E	O	O	O	O	O	G1	△E	△E	△E	△E	△E	△E	O	O	O	O	G1	△E	O	O	O	△E	△E	△E	O	O	O	G1	△E	O	O	△E	△E	△E	O	O	O	O
		=										=																															
G2	O	O	O	O	O	O	O	O	O	O	G2	O	O	O	O	O	O	O	O	O	O	G2	O	O	O	O	O	O	O	O	O	△E	G2	O	O	O	△E	O	O	O	O	O	O
G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O
												=																															

(6) Vowels corresponding to J/o/

01	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	14	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	46	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	47	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
G1	O	O	O	X	O	O	O	O	O	O	G1	O	O	O	O	O	O	O	O	O	O	G1	O	O	O	O	O	O	O	O	O	O	G1	O	O	O	O	O	O	O	O	O	O
G2	O	O	O	O	O	O	O	X +	O	O	G2	O	O	O	O	O	O	O	O	O	O	G2	O	O	O	O	O	O	O	O	O	O	G2	O	O	O	O	O	O	O	X	O
G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O

(7) Rising diphthongs

11	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	31	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	45	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	46	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
G1	Oi	Oi +	Oi	O c	Oi	X +	Oi	Oi	O?	Oi	G1	O	O	O	O	O	O	O	O	O	O	G1	O	O	△ E	O	△ J	X	O	O	△ E	O	G1	O	O	O	O	O	X +	O	O	O	O
G2	Oi	Oi	Oi	Oi	Oi	Oi	Oi	Oi	Oi	Oi	G2	O	O	O	O	O	O	O	X +	O	O	G2	O	O	O	△ E	O	O	O	O	O	O	G2	O	O	O	O +	O	O	O	O	O	O
G3	Oi	Oi	O i/c	Oi	O c	Oi	Oi	Oi	Oi	Oc	G3	O X	O	O	O	O	O	O	O	O	O X	G3	O	O	O	O	O	△ E +	O	O	O	△ J	G3	O	O	O	O	O	O	O	O	O	O

(8) Centering diphthongs

09	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	38	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	47	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	48	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
G1	△ E	△ E +	O +	O +	O +	X X	O +	O	O	O	G1	X X	O	X X	O +	X X	O	O	O	O	O	G1	O	O	O	O +	O +	O	O	O	O	O	G1	X X	O	X X	O +	X X	O +	O	O	X X	X X
G2	O	O X	X X	O +	O +	O	O	O	O +	O	G2	O	O	X X	X X	O	O	O	O	O	O	G2	O	O	O	X X	O	O	O	O	O	O	G2	O	O	X X	X X	X X	O	O	O	X X	X X
G3	O	O +	O	O	O	O +	O	O	O	O +	G3	X X	O	O	O	O	O	X X	O	O	O	G3	O	O	O	O	O	O	O	O	O	O	G3	X X	O	O	O	O	O	X X	X X	O	X X

4. Consonant Naturalisation

(1) Voiceless stops/affricates

14	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	17	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	18	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	30	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
G1	Oc	Oi	Oi	Oc	Oi	Oi	Oi	Oi	Oi	Oc	G1	O	O	O	O	O	O	O	O	O	O	G1	O	O	O	O	O	O	O	O	O	O	G1	O	O	O	O	O	O	O	O	O	O
	●!	●!	●!	●!	●!	●!	●!	●!	●!	●!		●!	●!	●!	●!	●!	●!	●!	●!	●!	●!		●!	●!	●	X	●!	X	X	●!	●!	●!		●	●!	●	●!	X	●!	●!	●!	●	●
G2	Oi	Oc	Oi	Oi	Oi	Oc	Oi	Oi	Oi	X	G2	O	O	O	O	O	O	O	O	O	O	G2	O	O	O	O	O	O	O	O	O	O	G2	O	O	O	O	O	O	O	O	O	O
	●!	●!	●!	●!	●!	●!	●!	●!	●!	●		●!	●!	●!	●!	●!	●!	●!	●!	●!	●!		●!	●!	X	●	●!	●	X	●!	●!			●!	●!	●	X	●	X	●!	●!	●!	●!
G3	Oi	Oc	Oi	Oi	Oc	Oi	Oi	Oi	Oi	Oc	G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O
	●!	●!	●!	●!	X	●!	●!	●!	●!	●!		●!	●!	●!	●!	●!	●!	●!	●!	●!	●!		●!	●!	●!	●!	●!	●!	●!	●!	●!	●!		●!	●!	●!	●!		●!	●!	●!	●!	●!

Row 1: "O"=correct phoneme/allophone naturalisation, "△"=correct phoneme/incorrect allophone naturalisation (E=AE, ?=other), "X"=incorrect, "-"=not present

Row 2: "●"=syllabic structure maintained, "X"=syllabic structure broken, "!"=correct consonant + vowel + syllabic structure production achieved.

(1) Voiced stops/affricates

20	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	21	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	22	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	31	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
G1	O	O	O	O	O	O	O	O	O	O	G1	Oc	Oc	Oc	Oc	Oc	Oi	Oi	Oi	Oc	Oc	G1	O	O	O	O	O	O	O	O	O	O	G1	O	O	O	O	O	O	O	O	O	O
	●!	●!	●!	●!	●!	●!	●!	●!	●!	●!		●!	●!	X	X	●!	●!	●!	●!	●!	●!		●	●	●	●!	●!	●	●!	●!	●!	●!		●	●!	●	●!	X	●!	●!	●!	●	●
G2	O	O	O	O	O	O	O	O	O	O	G2	Oc	Oi	Oc	Oc	Oc	Oc	Oc	Oc	Oc	Oc	G2	O	O	O	O	O	O	O	O	O	O	G2	O	O	O	O	O	O	O	O	O	O
	●!	●!	●!	●!	●!	●!	●!	●!	●!	●!		●!	●!	●!	●!	●!	X	X	X	●!	●!		●!	●!	●!	●!	●!	●!	●!	●!	●			●!	●!	●	●!	●!	●!	●!	●!	●	●
G3	O	O	O	O	O	O	O	O	O	O	G3	O i/c	Oc	Oc	Oi	Oc	Oc	Oc	Oc	Oc	Oc	G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	X	O	O	O
	●!	●!	●!	●!	●!	●!	●!	●!	●!	●!		●!	X	●!	●!	●!	●!	●!	●!	●!	●!		●!	●!	●!	●!	●	●!	●!	●!	●!	●!		●!	●!	●!	●!	●!	●!	●!	●!	●!	●!

(3) Nasals

24	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	25	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	26	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	27	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
G1	O	O	O	O	O	O	O	O	O	O	G1	O	O	O	O	O	O	O	O	O	O	G1	O	O	O	O	O	O	O	O	O	O	G1	O	O	O	O	O	O	O	O	O	O
	●!	●!	●!	●!	●!	●!	●!	●!	●!	●!		●!	X/●!	●!	●!	●!	X	●!	●!	X	●!		●!	X	●	●	●	X	X	●	●	●		●!	●!	●!	●!	●!	●!	●!	●!	●!	●!
G2	O	O	O	O	O	O	O	O	O	O	G2	O	O	O	O	O	O	O	O	O	O	G2	O	O	O	O	O	O	O	O	O	O	G2	O	O	O	O	O	O	O	O	O	O
	●!	●!	●!	●!	●!	●!	●!	●!	●!	●!		●!	●!	●!	●!	●!	●!	●!	●!	●!	X		●!	X	●	●	X	X	●	X	●	●		●!	●!	●!	●!	●!	●!	●!	●!	●!	●!
G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O
	●!	●!	●!	●!	●!	●!	●!	●!	●!	●!		●!	●!	●!	●!	●!	●!	●!	●!	●!	X		●!	●!	●!	●!	●	X	●!	●!	●!	●!		●!	●!	●!	●!	●!	●!	●!	●!	●!	●!

(4) Voiceless fricatives

16	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	19	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	28	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	45	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
G1	O	O	O	O	O	O	O	O	O	O	G1	X/Oi	X	X	Oc	X	X	Oi	Oc	X	X	G1	△E	△E	△E	△E	△E	△E	O	O	△E	O	G1	O	O	O	O	O	O	O	O	O	O
	●	●!	●!	●!	●!	●!	●	●	●	●!		●!	●	●	●!	●	●	●!	●!	●	●		●!	●!	●!	●!	●!	●!	●!	●!	●!	●!		●!	●!	●!	●!	●!	●!	●!	●!	●!	●!
G2	O	O	O	O	O	O	O	O	O	O	G2	X	Oc	X	X	Oc	X	X/Oc	X	X/Oc	X	G2	△E	△E	△E	O	O	△E	O	△E	O	△E	G2	O	O	O	O	O	O	O	O	O	O
	●!	●!	●	●!	●!	●!	●!	●!	●!	●!		●	●!	●	●	●!	●	●!	●	●!	●		●!	●!	●!	●!	●!	●!	●!	●!	●!	●!		●!	●!	●!	●!	●!	●!	●!	●!	●!	●!
G3	O	O	O	O	O	O	O	O	O	O	G3	Oc	X	Oc	Oc	X	Oc	Oi	Oc	Oc	X/Oc	G3	△E	△E	△E	O	O	O	△E	O	O	O	G3	O	O	O	O	O	O	O	O	O	O
	●!	●!	●!	●!	●!	●	●!	●!	●!	●!		●!	●	●!	●!	●	●!	●!	●!	●!	●!		●!	●!	●!	●!	●!	●!	●!	●!	●!	●!		●!	●!	●!	●!	●!	●!	●!	●!	●!	●!

(5) Voiced fricatives

15	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	22	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	23	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	29	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
G1	O	O	O	O	O	O	O	O	O	O	G1	O	O	O	O	O	O	O	O	O	O	G1	X	X	X	O	X	X	O	X	O	X	G1	Oi	Oi	Oi	Oi	Oi	Oi	Oi	Oc	Oi	Oi
	●!	●!	●!	●!	●!	●!	●!	●!	●!	●!		●!	●!	●!	●!	●!	●!	●!	●!	●!	●!		●	●	●	●!	●	●	●!	●	●!	●		●!	●!	●!	●!	●!	●!	●!	●!	●!	●!
G2	O	O	O	O	O	O	O	O	O	O	G2	O	O	O	O	O	O	O	O	O	O	G2	X	X	O	O	X	O	O	O	O	O	G2	Oi/c	Oc/i	Oc	Oi	Oi	Oi	Oi	Oc	Oi	Oi
	●!	●!	●!	●!	●!	●!	●!	●!	●!	●!		●!	●!	●!	●!	●!	●!	●!	●!	●!	●!		●	●	●!	●!	●	●!	●!	●!	●!	●!		●!	●!	●!	●!	●!	●!	●!	●!	●!	●!
G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O	G3	Oc	Oc/i	Oi	Oi	Oi	Oi	Oi	Oc	Oi	Oi
	●!	●!	●!	●!	●!	●!	●!	●!	●!	●!		●!	●!	●!	●!	●!	●!	●!	●!	●!	●!		●!	●!	●!	●!	●!	●!	●!	●!	●!	●!		●!	●!	●!	●!	●!	●!	●!	●!	●!	●!

(6) Glides/Liquids

12	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	32	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	33	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	34	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
G1	△E	△E	△E	△E	△E	△E	O	O	△E	△E	G1	△E	△E	△E	O	△E	△E	△E	O	O	O	G1	△E	△E	△E	O	△E	△E	△?	O	△E	△E	G1	△E	△E	△E	O	△E	△E	O	O	△E	△E
	●!	●!	●!	●!	●!	●!	●!	●!	●!	●!		●	●	●	●	●	●	●!	●!	●!	●!		●!	●!	●!	●!	●!	●!	X	●!	●!	●!		●!	●!	●!	●!	●	●!	●!	●!	●!	●!	●!
G2	△E	O	△E	△E	O	△E	△E	△E	O	△E	G2	△E	△E	△E	△E	△E	O	O	O	O	O	G2	△E	O	O	△E	O	O	O	△E	O	△E	G2	△E	△E	△E	△E	O	O	O	△E	△E	△E
	●!	●!	●!	●!	●!	●!	●!	●!	●!	●!		●!	●!	●	●	●	●	●!	●	●!	●		●!	●!	●!	●!	●!	X	●!	●!	●!	●!		●!	●!	●!	●!	●!	●!	●!	●!	●!	●!
G3	O	O	O	O	O	O	△E	△E	△E	△E	G3	O	O	O	O	O	△E	O	O	O	O	G3	O	O	O	O	O	O	X/△J	O	△E	△E	G3	O	O	O	O	O	O	O	△E	△E	△J
	●!	●!	●!	●!	●!	●!	●!	●!	●!	●!		●	●	●!	●!	●	●	●	●	●!	●		●!	●!	●!	●!	●!	●!	●	●!	●!	●!		●!	●!	●!	●!	●!	●!	●!	●!	●!	●

5. Syllabic Structure

(1) N > N structures

05	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	06	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	26	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	27	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
G1	O	O	O	O	O	O	O	O	O	O	G1	O	O	O	O	O	O	O	O	O	O	G1	O	O	O	X	O	O	O	O	O	O	G1	O	O	O	O	O	O	O	O	O	O
G2	O	O	O	O	O	O	O	O	O	O	G2	O	O	O	O	O	O	O	O	O	O	G2	O	O	O	O	X	O	O	O	O	O	G2	O	O	O	O	O	O	O	O	O	O
G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O

"O"=correct, "-"=absent

(2) V > V structures

08	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	25	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	36	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	37	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
G1	O	O	O	O	O	O	O	O	O	O	G1	O	O	O	O	O	O	O	O	O	O	G1	O	O	O	O	O	O	O	O	O	O	G1	O	O	O	O	O	O	O	O	O	O
G2	O	O	O	O	O	O	O	O	O	O	G2	O	O	O	O	O	O	O	O	O	O	G2	O	O	O	O	O	O	O	O	O	O	G2	O	O	O	O	O	O	O	O	O	O
G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O

(3) CV > CV structures

06	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	24	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	29	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	38	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
G1	O	O	O	O	O	O	O	O	O	O	G1	O	O	O	O	O	O	O	O	O	O	G1	O	O	O	O	O	O	O	O	O	O	G1	O	O	O	O	O	O	O	O	O	O
G2	O	O	O	O	O	O	O	O	O	O	G2	O	O	O	O	O	O	O	O	O	O	G2	O	O	O	O	O	O	O	O	O	O	G2	O	O	O	O	O	O	O	O	O	O
G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O

(4) CjV > CjV structures

18	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	21	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	26	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	39	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
G1	O	O	O	X	X	O	X	X	O	O	G1	O	O	X	X	O	O	O	O	O	O	G1	O	X	O	O	O	X	X	O	O	O	G1	O	O	X	O	O	O	O	O	O	O
G2	O	O	O	X	O	O	X	X	O	O	G2	O	O	O	O	O	X	X	X	O	O	G2	O	X	O	O	X	X	O	X	O	O	G2	O	O	O	O	O	O	O	O	O	O
G3	O	O	O	O	O	O	O	O	O	O	G3	O	X	O	O	O	O	O	O	O	O	G3	O	O	O	O	O	X	O	O	O	O	G3	O	O	O	O	O	O	O	O	O	O

(5) CV > CjV structures

40	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	41	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	42	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	43	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
G1	X	X	X	X	X	X	X	O	X	O	G1	X	X	X	X	X	X	X	O	X	X	G1	X	X	X	X	X	X	X	O	X	O	G1	X	X	X	X	X	X	X	O	X	O
G2	X	X	O	O	X	X	X	X	X	X	G2	X	X	O	O	X	X	X	X	X	X	G2	X	X	O	O	X	X	X	X	X	X	G2	X	X	O	O	X	X	X	X	X	X
G3	X	O	X	X	X	X	X	O	X	X	G3	X	O	X	X	X	X	X	O	X	X	G3	X	O	X	X	X	X	X	O	X	X	G3	X	O	X	X	X	X	X	O	X	X

Chapter 5
Conclusion

In this thesis, I have discussed issues related to Japanese language learning, focussing on the competency of naturalising loanwords into Japanese by Australian students. As noted in Chapter 1, the current study has attempted to address this issue in terms of staggered levels of Australian learners of Japanese, and by examining their competency with JLN (Japanese Loanword Naturalisation). Four levels of JLN were examined: (i) Open Syllabication, (ii) Germinate Formation, (iii) Vowel Naturalisation and (iv) Consonant Naturalisation. The important findings of the study can be summarized in terms of these four levels, as shown below.

Firstly, the study investigated the phonological forms of beginner, intermediate and advanced Australian speakers in terms of JLN Open Syllabication, and the differences between their production and that of native Japanese speakers. Given that Japanese (the target language) is an open-syllable language, and Australian English (the subject's mother language) is closed-syllable, it was expected that learners would revert to closed-syllable structure in consonant cluster production. However, as discussed in 2.4.1 and 4.1, this tendency was observed only in a small number of the responses from subjects (mostly in G1, declining sharply in G2 and G3 production), with the larger number of subjects producing OS inserts in those places that native speakers use OS. In terms of actual production, G1 (lower level learners) appears to produce the lowest frequency of correct inserts, as well as possessing the greatest number of absence of inserts and hypercorrections (mostly *u*). At G2 and G3 level, most absence disappears, with high level correct production of *u*, *o* and *i* inserts in that order of correctness, with some hypercorrection (mostly *u*).

Secondly, JLN Germinate Formation was examined in terms of differences between learner and native Japanese production. Since GF, like OS, is a process not found in AE, it thus must be learnt by subjects. A tendency for absence of GF was observed among cells G1 and 2 (lower and intermediate learners) subjects, with a higher level of correct production was observed among G3 (advanced learners). However, a second examination of environments which native speakers would not use GF in indicates that learners hyper-correct with regard to GF, so it must be concluded that while GF competency rises quite high in proportion with learners' overall Japanese competency, that some vagueness in regard to GF rules also exists.

Thirdly, in the study's examination of the phonological forms of beginner, intermediate and advanced Australian speakers of Japanese, and their differences with native Japanese production in terms of JLN Vowel Naturalisation, all cell responses were of a native-like level in terms of vowel quality of front and back monophthongs, and rising diphthongs. However, all groups had difficulties with central vowels and centering diphthongs – two vowel groupings that can be classified as '*unknown partners*' (the less similar of converging phonemes in a language moving into one in the target language). A second vowel quality difficulty took place on an allophonic/phonetic level where, while the learner's phoneme selection is correct, their allophonic production, while still being communicable, is not compatible with the allophones used by native speakers (*'wrong winners'*). *Wrong winners* were most prevalent in G1 production and diminished significantly in G2 and G3 production. Little difficulty in terms of vowel duration was observed in the current study's duration results (4.3.2). Cells G1, G2 and G3 demonstrated native-like production with all the monophthongs and rising diphthongs, although difficulty in producing centering diphthongs was observed in G1, and to a less extent in G2 and G3.

Fourthly, in terms of the phonological forms of beginner, intermediate and advanced Australian speakers of Japanese in JLN Consonant Naturalisation, and their differences from native Japanese production, as with the VN results above, all groups successfully produced most consonants to a high level in terms of consonant quality, but there are still several *'unknown partners'* that learners appear to find problematic (with G1 possessing the greatest number and G3 the lowest number of incorrect responses). In addition, on an allophonic/phonetic level, G1, G2 and G3 all recorded high levels of correct pronunciation, but clearly all had staggered degrees of *'wrong winner'* production. Finally, all groups demonstrated some difficulties in areas of transference of moraic/syllable structure from AE to JLN. All groups performed poorly in CV>CjV items, G1, G2 and G3 showed native-like moraic structure production for CV, V and N items

(although N is somewhat subject to OS hyper-correction), with G1 and G2 giving somewhat less correct CjV>CjV productions than G3.

To summarize, while an increase in JLN competency in line with general Japanese competency was observed in terms of OS, GF, VN and CV, a number of reoccurring areas were also observed. It is hoped that a clearer understanding of JLN may be gained via the model presented in the current work, as well as an insight into learner difficulties via the subject production commentary within this work. It is the author's hope that this might provide a stimulus for encouraging the development of greater Japanese language communicative ability in fellow Australian learners.

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